ATLANTIC PROVINCES INTELLIGENT TRANSPORTATION SYSTEMS STRATEGIC PLANNING STUDY

Final Report

Prince Edward Island

NOVA SCOTIA

New Brunswick Nouveau CANADA

Government of Newfoundland Labrador

Atlantic Canada
Opportunities
Agency

Transport Canada Transports Canada

[illegible] TRANSPORTATION SYSTEMS

IBI GROUP
MRC
ADI

New Brunswick Department of Transportation
Nova Scotia Department of Transportation & Public Works
Prince Edward Island Department of Transportation & Public Works
Newfoundland & Labrador Department of Works, Services & Transportation
Transport Canada
Atlantic Canada Opportunities Agency

Atlantic Provinces Regional Intelligent Transportation System Strategic Planning Study

Final Report

November 2002

IBI
GROUP

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ATLANTIC PROVINCES INTELLIGENT TRANSPORTATION SYSTEMS STRATEGIC PLANNING STUDY

Executive Summary

Prince Edward Island

NOVA SCOTIA

New Brunswick Nouveau
CANADA

Government of Newfoundland Labrador

Atlantic Canada
Opportunities
Agency

Transport Canada Transports Canada

TRANSPORTATION SYSTEMS

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Introduction

There are a number of unique transportation challenges faced by the Atlantic Provinces. The region has a widely dispersed population interconnected via a network of critical road, bridge, and ferry links. Inclement weather can induce severe and sudden impacts on the transportation network. Some areas of the region are quite remote to major North American markets and therefore rely on an effective transportation network to minimize costs. Other areas within the region, namely New Brunswick, are in relatively close proximity to the large northeastern U.S. market and rely upon the associated trade corridors. Trade and the movement of commercial vehicles are critical to the economic viability of the region, and tourism plays a large and ever increasing role in the economy.

Intelligent Transportation Systems (ITS) refers to the use of technology to improve the efficiency, safety, convenience and accessibility of surface transportation systems. In the context of the Atlantic Region, ITS provides the opportunity to:

- improve road safety and emergency response, with an emphasis on the rural environment;
- improve accessibility for tourism;
- improve efficiency for intermodal facilities, commercial vehicles and border crossings; and
- enhance the economic prosperity of the region.

The Strategic Plan incorporates the requirements and ambitions of a broad range of stakeholders who have an interest in the advancement and implementation of ITS in the region. The work began with an initial outreach to the stakeholder community and an environmental scan to assess the needs of each province. The needs were translated into an ITS vision for the region which in turn was refined to form the User Service Plan. Through stakeholder involvement, 22 specific strategic projects were ultimately developed, resulting in an implementation plan. An Economic Development and Academic/Research component was performed in parallel to the main project, focusing on advancing the Atlantic Region ITS industry.

Prince Edward Island

Nova Scotia

New Brunswick

Newfoundland Labrador

Atlantic Canada Opportunities Agency

Transport Canada Transports Canada

Participation

The Strategic Planning effort was led by a project steering committee that included:

Nancy Lynch, New Brunswick Department of Transportation
Doug Shea, Newfoundland and Labrador Department of Works, Services and Transportation
Mike Kendrick, New Brunswick Department of Transportation
Cathy Worth, Prince Edward Island Department of Transportation and Public Works
Janice Harland, Nova Scotia Department of Transportation and Public Works
Shannon Sanford, Business New Brunswick
Mark Gourley, Atlantic Canada Opportunities Agency
Daryell Nowlan, Atlantic Canada Opportunities Agency
Michael Zinck, Atlantic Canada Opportunities Agency
Andrew Parsons, Atlantic Canada Opportunities Agency
Harold Hefferton, Transport Canada
Roger Saunders, Transport Canada

The involvement of all project stakeholders was vital to the development of the Strategic Plan. Effective methods of maintaining stakeholder dialogue were used to receive input from stakeholders that shaped the ITS vision, goals and objectives. A project website was developed to interact with project stakeholders. The website was used to conduct an on-line survey of stakeholder activities and interest in ITS. The website was also used to post meeting announcements, background information, and completed documents. A series of meetings were held to maintain stakeholder dialogue:

Meetings	Attendees
The initial sessions were held in Moncton, Charlottetown, Halifax, and St. John's. The one-day sessions were used to introduce the study, describe ITS, and obtain input on the Atlantic Region transportation needs, the ITS vision, the higher priority ITS User Services, and some potential "early winner" ITS projects.	80
The second round consisted of a one-day workshop held in Moncton. This workshop was used to obtain input on the resources necessary to implement ITS projects in the Atlantic Region, the potential barriers, and the steps that would be required for delivery of ITS projects.	60
The third round consisted of half-day workshops held in Halifax and in St. John's. The Halifax workshop was partnered with an ITS Capabilities Showcase. The St. John's workshop was held in conjunction with the Canadian Transportation Research Forum (CTRF) Conference. These workshops were used to obtain additional input on the project profiles, and the proposed deployment plan.	42

It was through the dedication and interest of eighty stakeholders within the region that the Strategic Plan evolved to reflect the needs of the Atlantic Provinces.

Stakeholders included:

- owners/operators of transporation infrastructure
- emergency service providers
- commercial vehicle operators
- tourism industry representatives
- suppliers and service providers
- academia
- special interest groups

Benefits of ITS

ITS has become a mainstream element of the transportation industry, with a proven ability to improve service delivery and reduce costs.

Efficiency

Roadway sensors are used to identify areas of congestion on the road network. This allows for route-guidance through changeable message signs or radio announcements. Electronic Payment methods efficiently collect tolls and tariffs, increasing through-put at border-crossings and toll facilities. Urban areas optimize road-usage with adaptively controlled traffic signals.

Productivity

Commercial Vehicle Operators use asset management systems to increase the productivity of their fleets and containers. Technology allows trucks to be monitored and inspected without losing time. Electronic Clearance can be incorporated at border crossings and inspection areas to eliminate or greatly reduce the length of stoppages.

Safety & Security

Drivers can be alerted of potential hazardous conditions. Incidents can be detected automatically, allowing for greatly reduced emergency vehicle response times. Electronic identification improves the process for screening cargo and drivers at border points.

Environment

Electronic Tolling and Advanced Traffic Management mitigates congestion leading to a reduction in emissions. Improving public transit systems by incorporating ITS can lead to increased ridership, and less dependence on automobiles.

Economy

Tourism benefits through the application of advanced Traveller Services to provide pre-trip and en-route trip planning, reservations, and current travel and weather information. Trade benefits through increased accessibility resulting from Commercial Vehicle Operations applications

Examples of Atlantic ITS projects are:

St. John's Metrobus Schedule Management System - Automatic Vehicle Location system that tracks the location of the 50-bus fleet, facilitating schedule management and the provision of real-time information on bus arrivals.

Electronic Toll Payment and Bridge Traffic Management - Electronic payment systems and dynamic signage on the Halifax-Dartmouth (H-D) bridges and the Confederation Bridge. The MacPass system reduces transaction times on the H-D bridge by 85%, thereby mitigating plaza congestion.

Halifax Adaptive Traffic Signal Control System (SCOOT) - Real-time data continuously updates traffic signal timings, thus increasing operational efficiency and providing more throughput on the existing road system. Fuel savings are estimated at $2-3 million over 3 years.

Weigh-In-Motion, New Brunswick - Automated weighing of vehicles at speed to eliminate the need for trucks to stop, thereby reducing delays to commercial vehicle operators and collision risk at the access points. The Longs Creek installation avoided substantial capital costs associated with relocation of the main scale facilities.

Road Weather Information Systems (RWIS) - RWIS implementations in New Brunswick, Prince Edward Island and Nova Scotia provide current conditions monitoring/forecasting to optimize winter maintenance and provide advisories to travellers.

For commercial vehicles - On-board safety systems, electronic clearance and automated roadside safety inspections are estimated to reduce fatalities by 14 to 32%. Automated administrative processes yield benefit/cost ratios of 4:1 for medium sized carriers and 20:1 for large-sized carriers

(source U.S. D.O.T.)

For rural areas - Use of mayday emergency notification devices could reduce the time it takes to discover a rural accident from an average of 9.6 minutes to 1 minute.

(source U.S. D.O.T.)

ITS Vision

In developing the Strategic Plan, it was important to first set out an ITS vision for the coming twenty years...

> *... People and goods move seamlessly throughout the Atlantic Region. Technology performs a key role in improving the performance of transportation systems. Information technology is a driving force behind how people get to work, do business, and sell and transport goods. The role of the public transportation right-of-way has expanded to include a telecommunications backbone making "e-solutions" for mobility and commerce possible in the region. Consider...*

Travellers can:

- pay tolls electronically without having to stop;
- receive current region-wide travel and weather condition updates before or during their trip; and
- readily communicate with their places of business, make hotel or ferry reservations, and have advance information regarding routes, schedules and space availability.

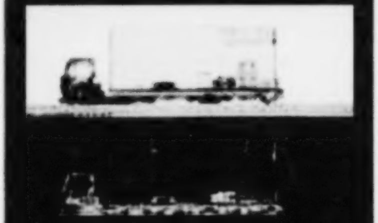
Commercial Vehicle Operators can:

- pay tolls and tariffs electronically at toll facilities and the New Brunswick - Maine border crossings;
- use enhanced tracking and real-time management of shipments en-route and at intermodal terminals; and
- obtain electronic clearance past weight/inspection stations.

Public Authorities can:

- receive automatic notification of an incident and dispatch Emergency Services along the fastest route to the site, based on real-time travel information and dynamic route guidance in the vehicle;
- improve public transit system performance using sophisticated vehicle monitoring and customer information systems; and
- optimize the application of winter maintenance resources using forecasting based upon region-wide real-time conditions monitoring.

Electronic Toll Tag



Automated Cargo Inspection

The Strategic Plan

Transportation Needs & ITS Goals

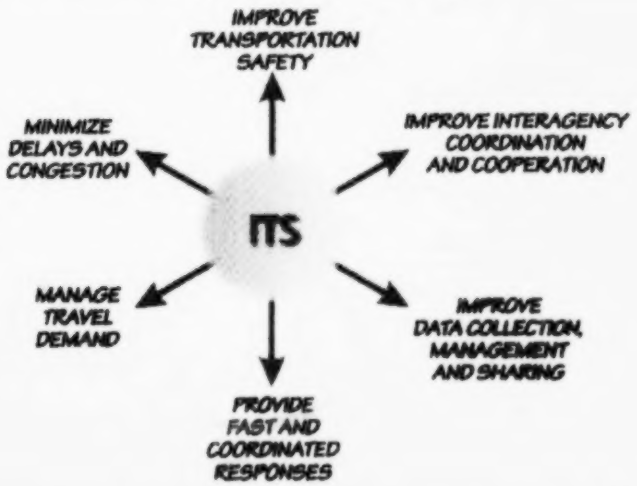
ITS is a useful tool for developing and enhancing the transportation system to accommodate the growth potential of the region. Through input from the participants in the region, fifteen critical Transportation Needs were identified:

Transportation Needs

1. Expedited Border-Crossing Inspection and Clearance for Commercial Vehicles
2. Reduced Rural Road Collisions Through Early Detection of Adverse Conditions
3. Reduced Incidence, Severity and Cost to the Community of Road Collisions
4. Improved Safety in Road Work Zones
5. Enhanced Management of Winter Maintenance Operations
6. Expedited Weight, Credential, and Safety Checks for Commercial Vehicles
7. Road Emergency Notification and Information System for Rural Areas
8. Improved Ferry Services
9. Travel Incentives and Traveller Information to Promote Tourism in Atlantic Canada
10. Enhanced Safety and Security for Travellers and for Transportation Operators and Facilities
11. Enhanced Ability to Detect, Verify, and Respond to Incidents on Major Roadways
12. Enhanced Tracking and Real-Time Management of Containers and Other Goods at Intermodal Terminals
13. Real Time Transit Service Monitoring and Public Needs
14. Improved Management of Fleet Transportation Services
15. Real-Time Management of Parking Operations

ITS Goals

The Strategic Plan features a set of ITS Goals that structure how ITS should be used in addressing the identified needs. The following goals were recognized as being fundamental to the successful application of ITS in the region:


IMPROVE TRANSPORTATION SAFETY
MINIMIZE DELAYS AND CONGESTION
IMPROVE INTERAGENCY COORDINATION AND COOPERATION
ITS
MANAGE TRAVEL DEMAND
IMPROVE DATA COLLECTION, MANAGEMENT AND SHARING
PROVIDE FAST AND COORDINATED RESPONSES

> "The Government of Canada is committed to the implementation of a comprehensive ITS strategy for Canada"
> Transportation Minister
> David Collenette

The Strategic Plan

User Services

The proposed ITS solutions were based on the ITS Architecture for Canada. The following is a description of each User Service Bundle (in bold) and the sixeen applicable User Services (in italics) as defined in the Architecture.

Traveller Information Services use advanced systems and technologies to manage information to help drivers decide when and the best route to drive, as well as reserve rides and other traveller services. For the region, *Traveller Information* and *Traveller Services* and *Reservations* are applicable.

Traffic Management Services consist of advanced systems and technologies to improve the efficiency and operation of the surface transportation infrastructure and create safer conditions for travellers. Included in this bundle are *Traffic Control, Incident Management, Environmental Conditions Management, Operations and Maintenance,* and *Automated Dynamic Warning and Enforcement.*

Public Transport Services use technology and advanced systems to improve performance, security and convenience of urban, suburban and rural transit systems. The most applicable User Service in this bundle is *Public Transport Management.*

Electronic Payment Services provide travellers with an electronic payment option for different transportation modes and services. The User Service identified as relevant to the region is *Electronic Payment Services.*

Commercial Vehicle Operations is concerned primarily with freight movement and focuses on services which improve private sector fleet management and freight mobility, and streamline government/regulatory functions. *Commercial Vehicle Electronic Clearance, Intermodal Freight Management,* and *Commercial Fleet Management* have potential applications in the Atlantic Region.

Emergency Management Services relate directly to the detection, notification and response to emergency and non-emergency incidents that take place on or adjacent to the roadway. Services applicable to the region include *Emergency Notification and Personal Security, Disaster Response and Management,* and *Emergency Vehicle Management.*

Vehicle Safety and Control Systems use sensors in vehicles and roadways to diminish both the number and severity of collisions. Services in this bundle were deemed less appropriate for the immediate needs of the region.

Information Warehousing Services include the gathering, fusion, and dissemination of weather and other data, as well as the archiving and sharing of historical transportation data. *Weather and Environmental Data Management* has potential application to the Atlantic Region.

The ITS Architecture for Canada provides a common framework for planning, defining, and integrating intelligent transportation systems.

The Strategic Plan

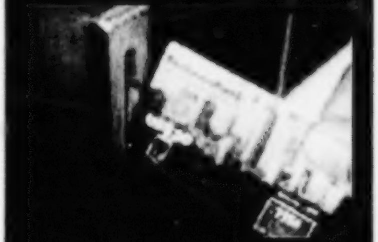
Strategic Actions

There are four important aspects of the Strategic Plan that must be considered when deciding to undertake a project and which stakeholders to involve. The critical Strategic Plan attributes are:

- Key Beneficiaries;
- Delivery Participants;
- Availability of Technologies; and
- Operations and Maintenance Considerations.

Container Security

Road Weather Information Systems



An analysis of these attributes identified a number of actions that could reduce institutional barriers:

- Continued regional coordination meetings among the Provinces, under the direction of the Council of Atlantic Premiers, and in coordination with other related forums, such as that for the harmonization of trucking regulations;
- Education of the purchasing agencies within the public sector owner/operators on the nature of the systems procurement process, and the distinguishing features relative to the conventional construction process;
- Pursuit of joint procurement by public agencies within the region in order to employ common equipment specifications, and take advantage of economies of scale;
- Identification and engagement of a champion(s) from the tourism industry associations and Provincial Departments of Tourism in order to help realize opportunities with traveller information services;
- Continued representation of the four Atlantic Provinces and the related transportation stakeholders as a common voice in dealing with peer agencies such as Transport Canada, and the I-95 Corridor Coalition;
- Identification of lead agencies, or joint ventures among peer agencies in order to take the initiative on multi-party, back office applications, such as that required for data warehousing and potentially electronic payment;
- Advancement of the development and deployment of various applications, such as those related to border crossings and intermodal terminals, through the scoping of pilot projects; and
- Utilization of opportunities to implement ITS applications related to commercial vehicle operations and border crossings under the Smart Borders Initiative.

The Strategic Plan

Strategic Projects

Stakeholder participation resulted in the identification of 22 Strategic Projects. The lead participants or "Champion" for each project will drive the process from strategic concept to reality. These projects are intended to directly address the transportation needs and include the potential for 'early winner' deployment to illustrate benefits. The proposed projects include:

Traveller Information Services

TI-1	Atlantic Provinces Advanced Traveller and Tourist Information System

Traffic Management Services

TM-1	Atlantic Provinces ARWIS Expansion
TM-2	Wildlife Detection in Atlantic Canada, Scoping Study and Pilot Project
TM-3	Implementation of Fixed Automated Spray Technology for Bridge De-icing
TM-4	Red Light Camera Pilot Project
TM-5	Portable Changeable Message Signs for Work Zones
TM-6	Smart Snowplow Expansion
TM-7	Bridge Incident Management Scoping Study

Public Transport Services

PT-1	Urban Transit Real-Time Information Service
PT-2	Community Transit Fleet Management

Electronic Payment Services

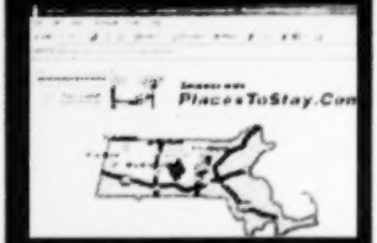
EP-1	Parking Electronic Payment and Monitoring
EP-2	Atlantic Canada Transaction Tag
EP-3	Smart Card Pilot Project

Commercial Vehile Operations

CV-1	Integrated Intermodal Information System
CV-2	Atlantic Trade Corridor Border Security and Electronic Inspection
CV-3	Atlantic Canada Electronic Permitting for Oversized and Overweight Vehicles
CV-4	Port Operational Information Extranet
CV-5	Port Container Security
CV-6	Airport Groundside Transportation Management
CV-7	Commercial Fleet Management Program

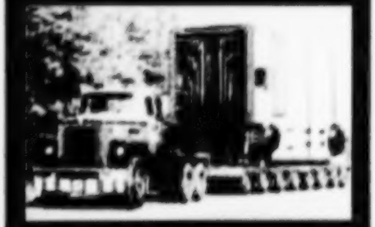
Emergency Management Operations

EM-1	Wireless Network Expansion
EM-2	Atlantic Provinces Disaster Response Plan Scoping Study



Traveller Information

Advanced Public Transportation Systems



Electronic Permitting for Oversized and Overweight Vehicles

The Strategic Plan

The Strategic Plan recommendations will promote coordinated and efficient deployment of ITS in Atlantic Canada.

Deployment Program

In order to better guide the implementation, allow for evaluation of progress, and permit proper allocation of financial resources, the deployment schedules for the various projects were sub-divided into the following categories, as applicable:

- Planning, legislation and research activities;
- Design of the system or infrastructure;
- Procurement of the required technologies and pilot project installation; and/or
- Full deployment or construction of the project.

A key component of the Deployment Program is the Action Plan for Ongoing Evaluation. The goal of the Ongoing Evaluation is to provide a framework for the stewardship of the overall Atlantic Provinces Regional ITS Strategic Plan.

The specific elements include:

- Project tracking;
- A resource group to make suggestions if a project is encountering difficulties; and
- Dissemination of information on the ITS activities to stakeholders in the Atlantic Region.

The tools to be used to oversee the Action Plan include:

- Establishment of a permanent Atlantic Provinces ITS Steering Committee;
- Maintenance of the ITS Roundtable; and
- Ongoing engagement of stakeholders.

The ongoing engagement of stakeholders should be pursued through:

- Use of the Atlantic ITS website to post announcements concerning new projects, relevant events, and project progress reports. A permanent host, and website administrator will need to be established; and
- Participation in industry assocations such as ITS Canada.

A regional ITS architecture for the Atlantic Provinces would identify the functions, organizations, and information flows that are relevant to the region. Furthermore, the regional architecture provides stakeholders with customized views from their perspective, allowing for identification of integration/cooperation activities.

The Strategic Plan

Economic Development and Academic/Research

An analysis has been undertaken to identify the Economic Development and Academic/Research opportunities associated with the expansion of the ITS industrial base in Atlantic Canada. The objective of this effort was to profile the existing ITS industrial capabilities within the region in the context of the North American and world markets, and provide recommendations to strengthen the industrial base. The approach included an outreach and profiling of the relevant resources within the region, and a high level market analysis. The analysis was undertaken under the direction of an ITS Roundtable comprised of public sector, private sector and academic representation from the four Atlantic Provinces. This effort builds upon the foundations as set forth by past efforts undertaken by Transport Canada, Industry Canada, and the Atlantic Canada Opportunities Agency.

The industry scan identified 38 companies within the region that offer products or services relevant to the ITS industry. Some firms already participate in the industry, in areas such as road weather information system deployment and related services, commercial vehicle tracking and fleet management, and geographic information systems.

There is a general trend wherein the companies which are participating in the ITS market have transferred technologies from other related industries which have an industrial presence in the region. Drawing upon the resources of related companies, or partnerships with other organizations, there is the opportunity to deliver more complete applications and expand geographic reach. There is a strong network of potential support for the further development of an ITS industry in the form of industry associations (particularly information technology), centres of excellence, incubators/accelerators, and high-level academic institutions.

Post secondary training in ITS (or related fields) is offered at the University of New Brunswick, New Brunswick Community College, Dalhousie University, Memorial University, and the University of Prince Edward Island. There is benefit in linking centres into networks for collaboration and information sharing.

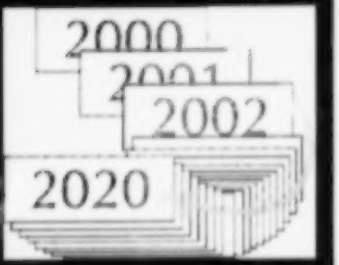
A review of the Atlantic industry in the context of the international ITS market yielded some key observations, as follows:

- Canada has historically been at the forefront of ITS deployment, with several examples of successful firms active in the world market. However, a recommitment to funding is required from stakeholders if Canada is to maintain its competitive advantage in the world market.
- The North American market is the most accessible and best matches the capabilities of the Atlantic ITS industry. In addition, there is potentially a very large market in the developed and emerging economies worldwide, particularly in Latin America and Southeast Asia.
- The primary weakness of most Atlantic Region firms is the relatively small size and level of capitalization in comparison to U.S. market participants.
- Increased opportunities to access the market may lie in the current efforts in the ITS industry to develop ITS standards, and through participation in international funding and marketing support initiatives.

Niche ITS areas where Atlantic Canadian resources can excel include:

- Road Weather Information Systems;
- Infrastructure Maintenance Management;
- Freight and Transit Monitoring;
- Fleet Administration; and
- Emergency Response Management.

Future Directions



The Atlantic Provinces are in a position to be a more active partner with rest of Canada and the U.S. in using [illegible] technology [illegible]

Next Steps

The Strategic Planning process has been critical in terms of engaging stakeholders, rationalizing needs, and developing strategic action items for advancing the applicable ITS solutions. It should be emphasized that the plan extends beyond the strategic perspectives and identifies specific action items and a series of projects. This underscores the need to set in place and maintain a regional program to oversee the follow-on activities. It is recommended that, under the direction of the Council of Atlantic Premiers, the project Steering Committee Group remain intact beyond the course of the project to fulfill a number of functions including:

- Ongoing engagement of the stakeholder community through the ITS Atlantic.com portal and various meeting forums in an effort to oversee the enactment of strategic action items to address institutional considerations;
- Oversight and coordination in the definition and undertaking of projects contributing to the deployment plan; and
- Ongoing monitoring role to track progress against the plan.

It is important that the ITS community in the Atlantic Region maintain this common point of reference, and common representation to other industry participants such as Transport Canada and the I-95 Corridor Coalition.

The Economic Development and Academic/Research analysis yielded a number of recommendations, including:

- All levels of government should continue to promote ITS applications through showcase projects in Atlantic Canada, involving local resources active in the targeted niche ITS areas.
- Private sector industry participants should exercise opportunities to access a variety of Canadian and international funding programs. Furthermore, firms should seek strategic partnerships with complementary Canadian and U.S. firms with a view to accessing the increasingly developed and well-funded U.S. ITS market.
- Selected academic institutions should explore the possibility of developing a centre of excellence for ITS focussing on the Atlantic niche areas, in partnership with other universities and private sector interests.

Entities such as ITS Canada and various regional clusters should help to reinforce the opportunities as set forth in this analysis through ongoing outreach and information exchange with the stakeholder community. Specific opportunities include the ITS Canada Annual General Meeting in early 2003 and the opportunity for the ongoing stewardship of the ITS Roundtable.

In conclusion, the plan has taken the initial steps in terms of engaging the stakeholders and undertaking analysis. Success will depend on continued involvement and actions among the stakeholders at the strategic and deployment level, under the stewardship of the Steering Committee.

II. ACKNOWLEDGEMENTS

The Atlantic Provinces Intelligent Transportation System Strategic Plan is a critical advancement in the evolution of ITS applications and industry within the region. The Plan sets out a course of action which will enable sustainable development of transportation systems applications in the region. The Plan is unique in the Canadian context in that it addresses such a broad, diverse geographical area encompassing stakeholders from four provinces.

This Plan was made possible through the active participation of the Steering Committee members and ITS Working Group, comprised of:

Mike Kendrick, New Brunswick, Department of Transportation

Janice Harland, Nova Scotia, Department of Transportation and Public Works

Harold Hefferton, Transport Canada

Daryell Nowlan, Atlantic Canada Opportunities Agency

Shannon Sanford, Business New Brunswick

Mark Gourley, Atlantic Canada Opportunities Agency

Doug Shea, Newfoundland and Labrador Department of Works, Services and Transportation

Cathy Worth, Prince Edward Island, Department of Transportation and Public Works

Roger Saunders, Transport Canada

Michael Zinck, Atlantic Canada Opportunities Agency

Andrew Parsons, Atlantic Canada Opportunities Agency

The success of the planning process is very much dependent upon the active participation of the stakeholder community. Throughout the course of the project, the Project Team called upon a broad range of stakeholders from the four provinces to participate in the form of submitting survey responses, attending focus groups, and attending workshops. The Project Team expresses sincere appreciation to the stakeholder community and the ITS Roundtable for their strong level of participation and commitment to the project.

On behalf of the Project Team, it has been our pleasure to serve the transportations stakeholders in the Atlantic Region, and we look forward to continued success in the advancement of the ITS program and industry within the region.

Nancy Lynch, Assistant Director
Transportation Policy,
New Brunswick Department of Transportation

Kevin Bebenek
Associate Director
IBI Group

III. GLOSSARY

The following is a summary of generally accepted acronyms that are referred to in this document.

TERM	DEFINITION
AM	Amplitude Modulated
APTS	Advanced Public Transportation System
ATIS	Advanced Traveller Information System
ATM	Asynchronous Transfer Mode
ATMS	Advanced Traffic Management System
AVI	Automatic Vehicle Identifications
AVL	Automatic Vehicle Location
CAD	Computer Aided Dispatch
CCRA	Canada Customs & Revenue Agency
CCTV	Close Circuit Television
CDMA	Code Division Multiple Access
CVISN	Commercial Vehicle Information Systems Network
CVO	Commercial Vehicle Operations
D/I	Driver Interface
DAB	Digital Audio Broadcast
DSRC	Dedicated Short Range Communication
ETC	Electronic Toll Collection
FM	Frequency Modulated
GPS	Global Positioning System
HAR	Highway Advisory Radio

TERM	DEFINITION
HAZMAT	Hazardous Material
HOV	High Occupancy Vehicle
I/F	Interface
ISP	Information Service Provider
ITS	Intelligent Transportation Systems
LCD	Liquid Crystal Display
LED	Light Emitting Diode
PCS	Personal Communication Service
SONET	Synchronous Optical Networks
TDMA	Time Division Multiple Access
T/I	Traveller Interface
TMC	Traffic Management Centre
UTC	Urban Traffic Control

IV. BACKGROUND

In Atlantic Canada and elsewhere, the introduction of new roads and additional road capacity is becoming less popular as a method of improving congested conditions. Environmental and financial constraints are becoming critical and often eliminate some potential projects from contention. Issues of insufficient road capacity and road safety are always at the forefront of transportation priorities and yet solutions are evolving from major infrastructure projects to other approaches that use Intelligent Transportation Systems (ITS). Intelligent Transportation Systems refers to systems that use technology to improve efficiency, safety, convenience and accessibility of surface transportation systems. The use of ITS offers the opportunity to implement improvements to transportation systems and provide community – wide benefits as a result.

An ITS strategic plan for Atlantic Canada is required to incorporate the needs and ambitions of a broad range of stakeholders that have an interest in the advancement and implementation of ITS. As such, the plan is intended to accomplish several tasks:

- Respect the goals and interests of the many stakeholders;
- Assist stakeholders in addressing their travel and operational needs;
- Promote coordination and integration of User Service development activities;
- Provide direction in the implementation staging of User Services; and
- Reduce intermodal transitioning and integrating national and international transportation systems.

WHY IS ITS IMPORTANT TO ATLANTIC CANADA?

There are a number of unique transportation challenges faced by the Atlantic Provinces. The region typically has a widely dispersed population distribution interconnected via a network of critical road, bridge, and ferry links. Some areas of the region are quite remote to major North American markets and therefore rely on an effective transportation network to minimize costs. At the same time, other areas within the region, namely New Brunswick, are in relatively close proximity to the large northeastern U.S. market and rely upon the associated trade corridors. Trade and the movement of commercial vehicles are critical to the economic viability of the region, and tourism is playing a large and ever increasing role in the economy. As was evident this past winter, weather can be severe and unpredictable. Other considerations include:

- The region must attract and maintain its existing business and tourism and transportation is a major consideration in this regard;
- The region must continue to forge links that tie together communities that are dispersed over a wide area separated by land and sea;
- The region must protect its unique nature and environment and look for new and innovative solutions to its transport needs;

- Conventional improvements in transportation infrastructure are costly and the delivery timeframes can be significant; and
- The ITS industry is itself new and growing and through its successful application in the region there is the potential to export the expertise and approach adopted by the local partners involved in its deployment.

Whereas the traditional development of transportation infrastructure focuses on civil infrastructure, there is an increasingly prominent role for information technology. It is recognized within the transportation industry that the application of ITS provides the opportunity to apply advanced technologies to leverage off the existing civil infrastructure to maximize safety and mobility. In the context of the Atlantic Provinces, these ITS benefits would translate into:

- Improved road user safety, with a particular emphasis on early warning of inclement weather conditions;
- Improved accessibility for tourism/recreational areas;
- Improved inter-modal transport efficiency;
- Improved mobility for commercial vehicles within the region and across the U.S. border;
- Improved emergency services;
- Reduced congestion delays, and the associated fuel consumptions and emissions in urban areas; and
- Enhancement of the overall economic prosperity of the region.

The industry can point to a number of functioning examples of ITS applications which have proven benefits in this regard. It should also be recognized that it is important to stimulate the coordination and integration of these various discrete ITS applications in order to access the higher order synergies and benefits associated with a seamless integrated transportation system.

WHY IS THE STRATEGIC PLAN IMPORTANT?

The Strategic Plan sets out a process to evaluate and select the most appropriate initiatives in keeping with an organized, supported, cohesive and coordinated plan. One of the most important outcomes from past efforts has proven to be the stakeholder outreach. Through this process we can put in place an organizational structure to provide ongoing administration and implementation of the ITS program. This plan will set out priorities, prerequisites and responsibilities for deployment building on the needs identified for the region. Innovative and creative solutions to these needs will be identified complete with early winners to help build program momentum.

The Federal Government has embarked upon the National ITS Program that incorporates a number of areas of focus that speak to the needs of the Atlantic Provinces. These include:

- An emphasis on commercial vehicles and trade corridors;
- Stimulation of increased deployment;
- Focus on the integration of various new and existing ITS applications to promote seamless interoperability; and
- Development of a National ITS Architecture to help facilitate the planning, deployment and integration processes.

In developing the ITS architecture for Canada, IBI Group incorporated a number of User Services which extend beyond those identified for the U.S. market and are particularly applicable in Atlantic Canada. Examples include measures targeted at infrastructure operations and maintenance and the optimization of the surface transport network interface with intermodal terminals.

The need to coordinate the movement of commercial vehicle traffic across the New Brunswick–Maine border is well recognized. Through this planning effort, the Atlantic Provinces will be able to work closely with, and engage other key stakeholders at the federal and international level. Note for their part, the U.S. program is very well defined and established at both the federal and regional levels. The I-95 Corridor Coalition has been in existence for nearly ten years.

Mainly as a result of geographic location and travel distances, Atlantic Canada has been disadvantaged by a lack of industrial investment and development. It has been proven many times that the Atlantic population can compete in hi-tech industry particularly where shipping costs to North American markets are not a prime concern. In this light, the ITS Strategic Plan can help to focus the regional opportunities for development of high-tech industry and commerce and for advancement of product and system research and development suitable to the ITS industry.

THE APPROACH

The approach to the work reflects a user needs based approach which is well proven through application under the U.S. National Program, and is consistent with the application of the ITS architecture. The successful engagement of the stakeholder community was critical to the success of the project. The outset of the work focused on the definition and initial outreach to the stakeholder community, and identifying methods to maintain stakeholder dialogue throughout the course of the project.

Once an initial outreach to stakeholders was initiated, the focus was collection of their input as part of the environmental scan, which resulted in the documentation of needs assessment. These needs were translated into a vision for ITS in the region which in turn were refined in terms of User Services.

Having established the User Service Plan, the project entered an analysis phase wherein we once again engaged the stakeholders with a view to respective roles and partnership opportunities.

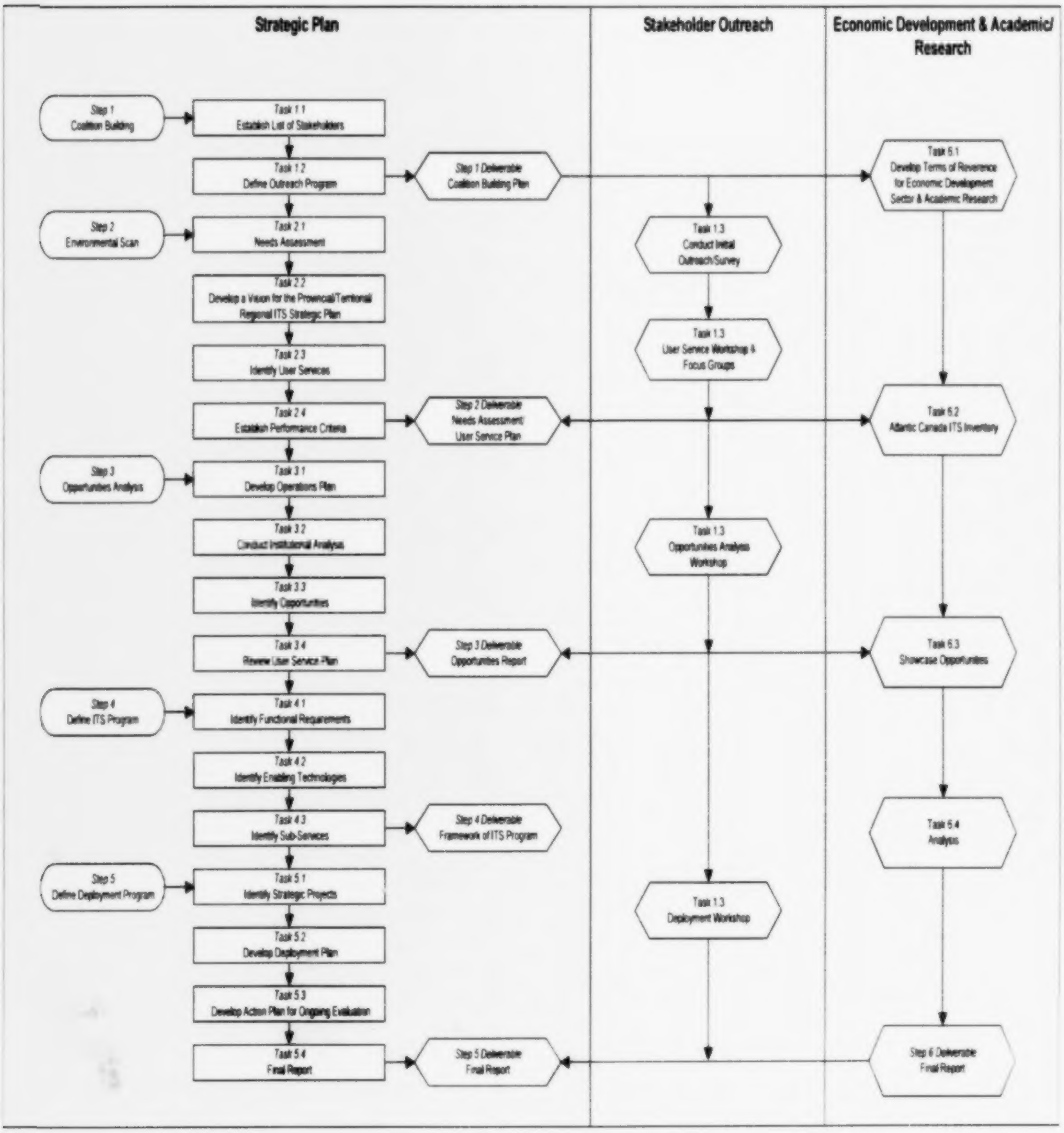
The National ITS Architecture was used to further define the ITS program in terms of functional requirements, key enabling technologies, and ultimately User Sub-Services. These sub-services directly relate to deployment-focussed aspects of the architecture, known as market packages.

From the framework of the ITS program, we identified and prioritized specific strategic projects, resulting in an implementation plan, finalized in consultation with the stakeholder community.

At the outset of the work, the project team developed terms of reference for Economic Development and Academic/Research component of the project. Subject to the ITS Working Group approval, the subsequent terms of reference tasks were undertaken in parallel with the rest of the study activities, drawing upon opportunities for interrelationships, and feeding into the overall final report.

Exhibit IV.1 on the next page illustrates the Strategic Plan workflow process, illustrating the stakeholder outreach activities as the input to the Strategic Plan development, and the simultaneous progression of Step 6 (Economic Development & Academic/Research) of the project.

Exhibit IV.1 – Strategic Plan Work Flow Process


Strategic Plan
Stakeholder Outreach
Economic Development & Academic/ Research
Step 1 Coalition Building
Task 1.1 Establish List of Stakeholders
Task 1.2 Define Outreach Program
Step 1 Deliverable Coalition Building Plan
Task 6.1 Develop Terms of Reverence for Economic Development Sector & Academic Research
Step 2 Environmental Scan
Task 2.1 Needs Assessment
Task 1.3 Conduct Initial Outreach/Survey
Task 2.2 Develop a Vision for the Provincial/Territorial Regional ITS Strategic Plan
Task 1.3 User Service Workshop & Focus Groups
Task 2.3 Identify User Services
Task 2.4 Establish Performance Criteria
Step 2 Deliverable Needs Assessment/ User Service Plan
Task 6.2 Atlantic Canada ITS Inventory
Step 3 Opportunities Analysis
Task 3.1 Develop Operations Plan
Task 3.2 Conduct Institutional Analysis
Task 1.3 Opportunities Analysis Workshop
Task 3.3 Identify Opportunities
Task 3.4 Review User Service Plan
Step 3 Deliverable Opportunities Report
Task 6.3 Showcase Opportunities
Step 4 Define ITS Program
Task 4.1 Identify Functional Requirements
Task 4.2 Identify Enabling Technologies
Task 4.3 Identify Sub-Services
Step 4 Deliverable Framework of ITS Program
Task 6.4 Analysis
Step 5 Define Deployment Program
Task 5.1 Identify Strategic Projects
Task 1.3 Deployment Workshop
Task 5.2 Develop Deployment Plan
Task 5.3 Develop Action Plan for Ongoing Evaluation
Task 5.4 Final Report
Step 5 Deliverable Final Report
Step 6 Deliverable Final Report

1. COALITION BUILDING

The constructive involvement of all project stakeholders is vital to the development of an effective strategic plan and to achieving coalition building. When collected properly, input from stakeholders can be used to shape the ITS vision, goals and objectives. The purpose of this chapter of the report is to document the Coalition Building Plan and results from the stakeholder outreach. The plan represents the first step undertaken in the development of the Atlantic Provinces Regional ITS Strategic Planning Study.

The first task, Establish List of Stakeholders, identified all stakeholders in the region who could have a direct interest in the ITS Strategic Plan. The stakeholder list provided in this document was used to contact stakeholders representing all modes of transportation.

The second task, Define Outreach Program, outlines the stakeholder outreach approach and methodology through a consultation plan. The consultation plan, using the stakeholder list as a starting point, focused on gathering input from stakeholders on current ITS needs and practices in the region, serving as the input into the visioning exercise. In addition to outlining an approach, the consultation plan forms a baseline reference for subsequent activities.

The remainder of this section outlines in detail the methodology and approach that was used to implement the Outreach Program and a summary of the results gained from each step in the program, including:

- Web Survey;
- Focus Groups; and
- Opportunities Workshop.

1.1 GOALS AND APPROACH

The goals of the Coalition Building Plan were as follows:

- Define a stakeholder community capturing the broad geographical and economic diversity of the Atlantic Provinces in order to ensure that the local ITS needs of the region are built into the Strategic Planning process;
- Provide the materials that will effectively solicit the input required to build a comprehensive understanding of local transportation needs and issues; and
- Establish a means by which the stakeholder group will survive the project and continue to work towards further ITS development in the region.

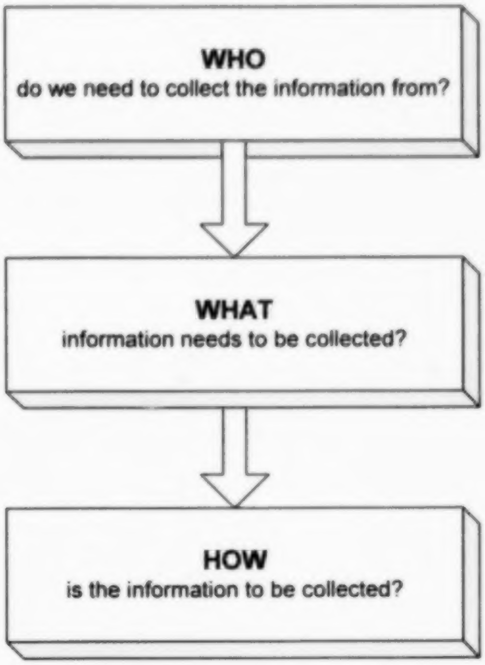
These goals were achieved by engaging the stakeholder community through an environmental scan (refer to Section 1.3). In order to assure quality stakeholder input to the planning process, a series of objectives for the consultation plan were identified. These objectives may be summarised as follows:

- **To identify potential stakeholder roles in ITS deployment.** The stakeholder consultation can achieve input on the perceived and actual respective roles of the public, private, and non-profit sectors in ITS deployment. Opportunities for co-operative deployment of ITS applications with other jurisdictions or institutions, through partnerships, delegation, or contracted services were explored.

- **To provide a strategy to obtain input from the stakeholders.** Stakeholder input was solicited regarding current problems and issues, existing ITS deployments (if any), and future requirements. This information will be used as a basis to define the Atlantic Region ITS program and to prioritize user needs and projects.
- **To identify measures of success and associated criteria.** Public sector, private sector and non-profit sector agencies may have different criteria for evaluating the success of ITS deployment. The stakeholders provided valuable input on methods which should be used to evaluate the success, in terms of efficiency and effectiveness, of the ITS strategy. Since individual stakeholders had different objectives, and therefore different measures of success, a key task for this plan was to recognize these differences and determine how to incorporate them into an integrated ITS program.
- **To identify institutional and other barriers to ITS deployment.** Stakeholders provided input on real and perceived institutional, technological, operational, financial, or other barriers to ITS deployment based on their business operations and constraints. They also suggested methods to overcome or reduce those barriers.
- **To build consensus for ITS deployment in the Atlantic Provinces.** In addition to the objectives cited above, stakeholder consultation served as a valuable opportunity to achieve buy-in to the ITS strategy. Typically, individuals and organizations are more receptive to ideas, and committed to a product, if they have had an opportunity to understand the goals, and to help shape the strategy. The consultation process assisted in establishing the predisposition of the private, public and non-profit sectors to a widespread ITS deployment in the Atlantic Provinces, thus providing the input required to identify "early winner" ITS projects.

The overall approach to soliciting input under this Coalition Building Plan was based on three primary stages illustrated in Exhibit 1.1:

Exhibit 1.1 – Coalition Building Plan Approach


WHO
do we need to collect the information from?
WHAT
information needs to be collected?
HOW
is the information to be collected?

The first stage involved defining the stakeholder community. The stakeholder list was developed using potential stakeholders throughout the public, commercial, institutional and special interest transportation sector in addition to stakeholders identified through the project team's local knowledge of the Atlantic region. It is important to note that the stakeholder list, as included in this document, has been "ever-greened" throughout the duration of this project. This has assured the broadest possible stakeholder outreach by allowing stakeholders to view and suggest other potential stakeholders.

The second stage of the approach involved the development of consultation materials to be used during the stakeholder outreach. These materials include the Web based survey and consultation workbooks and were made available on the project Web site and at the stakeholder workshops. The consultation materials were designed to inform the stakeholder on the goals and objectives of ITS in the context of the Atlantic planning study and to solicit input on their needs.

The third stage of the approach involved defining the instruments that were used for the consultation approach, primarily the Web based survey and the focus groups/workshops.

Each stage is discussed in further detail in the following sections.

1.2 STAKEHOLDER IDENTIFICATION

Prior to actual stakeholder consultation, the Steering Committee convened to provide input on the proposed Consultation Plan. The Consultation Plan was then modified as necessary and resubmitted to the Steering Committee for approval.

Once the Consultation Plan was approved, stakeholders were engaged in the consultation process. The stakeholder contact database that has been used and maintained throughout the project includes:

- Stakeholder name and contact information; and
- Method of ongoing communications to be used (e.g. email, meetings, etc.).

Exhibit 1.2 includes a summary of the types of stakeholders contacted:

Exhibit 1.2 – Stakeholder Categories

Public Sector Owners & Operators
Private Sector Owners & Operators
Government/Regulators
Customers & Service Providers
Suppliers & Consultants
Researchers
Special Interest Groups

We recognize that the general public is also a stakeholder, and represents the ultimate end user of many of the ITS services. Thus, it was important to ensure that the cross-section of stakeholders adequately represented the interests of the general public. Appendix A contains a list of the stakeholders along with their contact information.

1.2.1 Public and Private Sector Owners & Operators

The owners/operators are predominantly public sector agencies and include:

- **Provincial Government** – The Departments of Transportation from the four provinces operate highway networks. Provincial Government also has a major role in defining, funding and operating emergency services, including police and ambulance; and
- **Municipalities** – The municipalities operate roads, traffic control systems, transit systems, and emergency services.

There is a growing private sector presence in road operation. For example:

- The Confederation Bridge, Saint John Harbour Bridge, Halifax-Dartmouth Bridge, and Maritime Road Development Corporation (MRDC);
- The expansion of telecommunications companies into the transfer of traffic data; and

- The participation of financial institutions in transit "smartcard" projects.

The owner/operator category incorporates various private and public sector interests operating other modes such as rail, air terminals, and ports.

Owners/operators are able to provide input on:

- The current performance of their systems;
- Funding/financial issues;
- Institutional, legislative and technical barriers they have experienced;
- Perceptions of what can be achieved through the development of the regional ITS infrastructure; and/or
- Opportunities for ITS expansion and integration.

1.2.2 Government/Regulators

Government/Regulators represent branches of the government at either the national, regional or local level, that support the transportation infrastructure through regulatory legislation, policy setting measures or educational campaigns through constituent outreach programs, distribution of materials, etc. This stakeholder category overlaps with Public Sector Owners/Operators that own and/or operate ITS systems. However, while not all government/regulatory agencies own and/or operate ITS systems, most either directly affect or have an impact on existing or future ITS deployments.

Government/Regulators are able to provide input on:

- Institutional, legislative and technical barriers in both the regional and international context;
- Effects of policy and regulatory changes on the performance of the existing transportation infrastructure;
- Opportunities for ITS to address existing challenges in maximizing the efficiency of the existing infrastructure; and/or
- Identifying environmental, economic and social policies that can contribute to the development of the ITS infrastructure in the region.

1.2.3 Customers and Service Providers

The customers and service providers are predominantly private sector firms and/or associations representing private sector firms and individuals. They are identified as "customers" since in most cases they directly receive an ITS service for commercial purposes. In some cases, they are in the business of "information service provider" or value-added service provider, by repackaging ITS information and distributing it to the ultimate end user.

Customers are able to provide input on:

- Quality of the services they are currently receiving;
- Additional ITS services which are considered to be marketable and would enable them to expand their business interests;
- Institutional, legislative and technical barriers in dealing with interoperability among ITS service providers;
- Partnership opportunities; and/or
- Pricing structures that suit their business ventures.

1.2.4 Suppliers & Consultants

The suppliers category consists predominantly of private sector firms involved in manufacturing ITS components, designing and developing ITS products and services, installing ITS, and integrating ITS applications.

Suppliers are able to provide input on:

- Current advances in the development of ITS products and services;
- Their experiences in dealing with various owner/operators within the Atlantic Provinces and abroad;
- The characteristics and considerations related to the communications industry in the Atlantic Provinces which need to be reflected in the plan;
- Their perception of institutional, legislative, and technical barriers, and the role that local and regional governments and other regulatory bodies can play in addressing these barriers; and/or
- Methods in which they would look to government to play a leadership role in ITS business development within the Atlantic Provinces.

1.2.5 Researchers

The researchers category primarily consists of universities in the Atlantic Provinces that have current involvement in the development of ITS applications. The research institutions are able to provide input opportunities:

- To promote and apply ITS research in the Atlantic Provinces; and/or
- For partnerships and the role of research centres of excellence in developing and implementing "early winner" ITS deployments.

1.2.6 Special Interest Groups

The special interest groups category is also often referred to as the non-profit sector, and it covers the broadest range of stakeholders. The agencies in this category play a key role in advising the public sector, and integrating public sector and private sector needs. The category includes advisory organizations, professional bodies, advocacy groups, volunteer groups, and consumer groups.

Environmental groups have become major stakeholders in transportation, and can play key roles in advocating transit-friendly, multi-modal transportation policies and programs. Professional bodies play a key role in information transfer, standards setting, education and training. They need to participate in developing appropriate institutional and technical support for the final ITS deployment plan for the region.

The special interests groups are able to supply input on the:

- ITS services desired by motorists;
- Role of ITS in addressing environmental issues;
- Role of ITS in promoting commerce in cities; and/or
- Role of ITS in improving safety.

1.3 INFORMATION NEEDS AND GATHERING

The type and detail of information required varied by stakeholder group, and in some cases by specific stakeholder depending upon their interest and involvement in ITS. Key areas of information collected for a stakeholder included:

- **Mandate:** The mandate of the stakeholder is important in defining their "circle of influence" both internally and externally, and identifying what areas of ITS may be relevant to their operations.
- **Transportation Modes and Services:** The modes and services that a stakeholder is responsible for is a key input for the subsequent identification of the initiatives in the ITS Strategic Plan.
- **Needs:** The needs of the stakeholders must be established objectively, and compared against their mandate and the transportation modes they cover. The needs identification will focus on the stakeholder's fundamental business and operating needs. Where available, supporting documentation and reports justifying needs are supplied by the stakeholders. The relevant needs (that can be addressed through ITS) are then mapped to the User Services in the Canadian Architecture for ITS.

Exhibit 1.3 includes a summary of the type of information that was collected from the stakeholder categories. The collection of this information was facilitated through the Web survey and focus groups, as discussed in the next section.

Exhibit 1.3 – Summary Of Information To Be Collected

Entities	Types of Information Required
Public and Private Sector Owners and Operators	• Current transportation needs; • Current performance of their systems and future system requirements; • Funding/financial issues; • Institutional, legislative and technical barriers that have experienced; • Opportunities for expansion and integration
Customers and Service Providers	• Quality of the services they are currently receiving; • Additional ITS services which would enable them to expand their business interests; • Institutional, legislative and technical barriers in dealing with ITS service providers; • Partnership opportunities
Suppliers	• Current advances in the development of ITS products and services; • Their experiences, positive and negative, in dealing with public agencies in the Atlantic Region • Their perception of institutional, legislative, and technical barriers; • Methods in which government can play a role in ITS business development within and outside of the Atlantic Region.
Special Interest Groups	• The ITS services desired by users; • The role of ITS in addressing environmental issues; • The role of ITS in promoting commerce and benefits to the Atlantic Region economy. • The role of ITS in improving safety and addressing the insurance industry needs.
Researchers	• Opportunities to promote ITS research; • The current and potential supply of ITS professionals through universities; • Opportunities for partnerships; • Funding/financial issues affecting research.

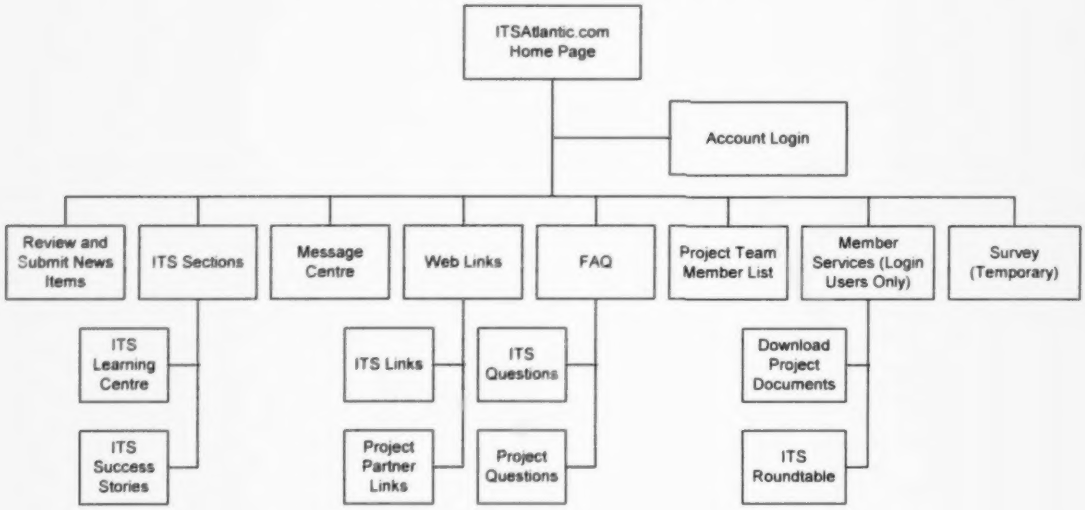
The following sections outline the instruments that were utilized in soliciting stakeholder input into the planning process. Information was solicited using a variety of media including the Internet, phone, email and fax. Stakeholders were able to access materials conveniently through the project Web site or through alternative formats upon request.

Soliciting quality input throughout the duration of the stakeholder outreach was crucial to the planning process. Accessibility and continuity of the information was also key to the success of the project. Therefore, each stakeholder was encouraged to continue their involvement in the project beyond their initial contact by participating in the focus group discussions, workshops, interviews and periodically visiting the project Web site to view announcements and news and also to share comments and ideas on past, present and future deliverables.

1.3.1 Web Site and Survey

The project web site (www.itsatlantic.com) provides a focal point where information and ideas can be exchanged between stakeholders, the project team and the steering committee. Exhibit 1.4 below outlines the site map for the project Web site.

Exhibit 1.4 – Project Web Site



The purpose of project Web site was twofold:

1. To provide Internet access to information about ITS in general and the ITS Strategic Plan. This gave stakeholders the necessary background for the project and ITS in general.
2. To provide a web based survey instrument, which allowed stakeholders to conveniently fill out the survey.

The web site incorporated information that described ITS and the Strategic Plan project in terms of:

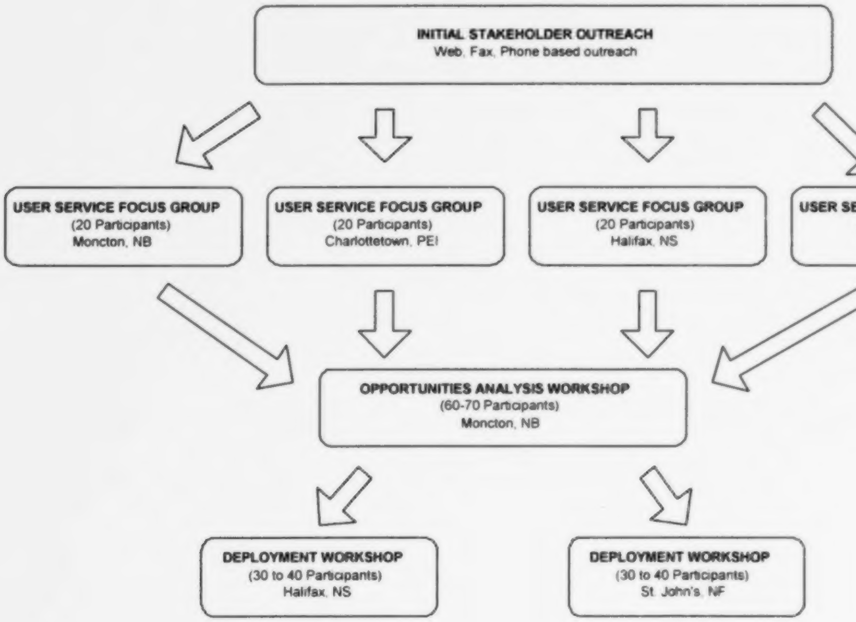
- What is ITS?
- How can you benefit from ITS?
- What is the Atlantic Provinces Regional ITS Strategic Plan? (i.e., overall scope, schedule, outputs, and downstream work, contact information).
- Atlantic Region ITS success stories.
- How can you help?

The Initial Outreach/Survey was targeted to all stakeholders outlined in Section 1.2. Prior to the Initial Outreach/Survey, the project Web site was established thus enabling all stakeholders to conveniently access project information on the Internet. For stakeholders that had no Internet access, the materials were provided via fax or mail. The initial outreach involved contacting each stakeholder either by email, phone or fax. Our experience has shown that voice contact by telephone is critical to achieving a high response rate for the survey, and we undertook these calls. Stakeholders were introduced to the project and encouraged to participate either through the Web based survey, the focus group discussions or the workshops.

1.3.2 Focus Groups and Workshops

Following the completion of the initial consultation outreach (questionnaire), a series of focus groups followed by workshops were held. Exhibit 1.5 illustrates the locations and anticipated audiences for the focus groups and workshops.

Exhibit 1.5 – Outreach Workflow



The User Service focus groups were intended to validate the vision developed using the results of the initial stakeholder outreach and to provide a prioritization of User Services as input to the User Service Plan (refer to Section 2). In order to assure representation from a cross section of interests from each province in the Atlantic Region, a focus group was undertaken in each province. The target audience consisted of approximately 20 to 25 stakeholders for each session, facilitated by two representatives from the consultant team.

The sessions included a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis. The objective of the SWOT analysis is to set the context for strategy development. The exercise was broken down into two activities: a brainstorming session and an analysis session. During the brainstorming session participants focused on ITS needs and ITS user bundles. During the Analysis session, participants identified SWOT for each User Service bundle, considering core competencies and life cycle issues. Based on the results of SWOT, participants developed a list of strategic objectives for the ITS strategy development and identified candidate "early winner" projects for further analysis.

The User Services focus groups represented the key forum of collecting information from stakeholders, and brought together similar stakeholders. The session was structured and facilitated using a "workbook" that guides the stakeholders in providing the information relating to their mandate, modes, needs, and inventory, as discussed in the previous sections. The results of the focus group are discussed later in this document (Section 2.1).

Three stakeholder workshops were held through the course of the study. These workshops provided stakeholder input in the development of key project deliverables. Each workshop was coordinated, facilitated and documented by IBI Group. The background materials (brochure and workbooks) were provided in print form at each workshop. Two representatives facilitated the workshop, with the project team expert advisors participating as well.

The following outlines the workshop activities in more detail, with particular attention to anticipated participants and arrangements.

Nearing the completion of the Step 3 task, an opportunities analysis workshop was convened in Moncton, New Brunswick. The intent of the workshop was to introduce stakeholder input in identifying and rationalizing potential roles and partnership arrangements among the stakeholder community. The workshop was structured around exercises aimed at opening a constructive dialogue with stakeholders and identifying initiatives for the ITS vision. These exercises included:

- Breakout groups to provide an assessment of the candidate User Services in terms of key beneficiaries, delivery participants, availability of technologies, operations and maintenance considerations, and known barriers to implementation; and
- Breakout groups to provide a detailed assessment of candidate early winner projects including development cycle, target milestones, and potential stakeholder roles.

The results of the opportunities workshops are discussed in Section 3.1 of this document.

Nearing the completion of the study, all stakeholders were invited to attend one of two deployment workshops. Following the first deployment workshop in Halifax, a second deployment workshop was held in St. John's, building on the results of first workshop. The goal of the two workshops was to provide stakeholder input in defining and prioritizing deployment activities as input to the Deployment Program (refer to Section 5).

1.4 WEB SURVEY RESULTS

The web survey was undertaken in October/November 2001. Once the website was fully developed and approved by the Steering Committee, the Consultant Team undertook e-mail and telephone contact to all stakeholders to direct them to the site and complete the survey. Of the two hundred stakeholders contacted, a total of 60 surveys were completed. The body of respondents is largely consistent with the group of stakeholders that attended the four User Service focus groups in early November 2001. The complete web survey results are included as Appendix B.

The responses to the survey questions are grouped as follows:

- Questions applicable to all stakeholders;
- Questions specific to the owner/operator category;
- Questions specific to the suppliers and service provider categories; and
- Questions specific to the researchers and special interest group categories.

1.4.1 All Stakeholders

Stakeholders were asked to indicate their areas of activity, without limitation to any one category. The owner/operator category, which includes regulators and municipal/regional agencies, was the predominant area of activity, with 60% of the responses. The supplier and service provider activity captured 24% of responses, followed by researchers, special interest groups and other at 15%.

The agencies were asked to categorize the relevance of their work to ITS, yielding a relatively even distribution among interested parties, a direct operations role or a non-operations involvement.

Each agency was asked to characterize their primary mandate. Public sector respondents typically indicated mission statements, reflecting socio-economic goals. Responses with an owner/operator perspective reflected a customer service focus and a mandate to manage transportation infrastructure. There was significant private sector representation, which was reflected through product and service development and marketing mandates.

Each respondent was asked to indicate the key external agencies they deal with in carrying out their mandate. The range of responses encompassed all types of stakeholders within the region. The responses reflected a wide array of federal and provincial government funding agencies, as well as the role of municipal economic development organizations. Some of the private sector suppliers/service provider industry participants reflected international markets through references such as the U.S. Aerospace and Defence Industry.

All stakeholders were asked to identify their perception of the institutional, legal and technical barriers to development of the ITS industry in Atlantic Canada. The majority of the responses in this area were from owner/operators, citing the following key barriers:

- The inability to raise project financing;
- The lack of interagency coordination and interoperability;
- The lack of technical standards to support that interoperability; or

- Various provincial and federal acts of legislation which inhibit seamless transportation in the region, such as the lack of harmonization in Provincial commercial vehicle regulations.

All stakeholders were asked to indicate which of the eight User Service bundles they considered to be most relevant to their areas of activity. Each of the stakeholder groups responded with a consistent profile, characterized as follows:

- The traveller information services and associated warehousing bundle were most prevalent, reflecting the need to better integrate existing information sources and package that information for use by travellers and carriers.
- Traffic management, public transportation, electronic payment and commercial vehicle operations were consistently prevalent, reflecting the specific interests of the relevant stakeholders.
- Emergency management services was relatively under-weighted in comparison to the level of attention directed in this area during the course of the focus groups, perhaps reflecting a lack of understanding of what is incorporated under this bundle.
- Conversely, vehicle safety and control seemed relatively over-weighted, again perhaps reflecting a lack of a clear understanding of what is involved in this bundle, capturing mobile data terminal type applications which might fall under the commercial vehicle or public transportation areas.

1.4.2 Owner/Operator

Each owner/operator agency was asked to indicate User Service bundles wherein the agency is currently using ITS applications or may have a future interest. The responses reflected a very even distribution among the eight User Service bundles in terms of where applications are currently being used and where future interest may lie. A detailed review of the responses indicate that some respondents took some liberties in terms of defining current activities that fall within the ITS User Service bundles. Specifically, some of the current activities in traveller information services may in fact reflect more static information delivery campaigns versus real-time interactive services. Similarly, the respondents interpretation of vehicle safety and control systems may be too broad.

Over 60% of respondents indicated they are active in ITS deployment/operations. Of those active in ITS, over 75% of the respondents indicated satisfaction with the performance of existing ITS applications. Many agencies recognize that they are currently only dealing with the initial phases of a longer term staged implementation plan which will hopefully yield ultimate benefits of system-wide deployment. The results reflected that 70% of the respondents are seeking partnership opportunities with other public or private agencies.

With respect to the benefits of ITS, the results indicated an even distribution of priority among customer satisfaction, improved operating efficiencies, and improved safety. There was marginally less emphasis on increased revenues (as this would not be relevant to some operations) and reduction of pollution (as this is more readily associated with large urban areas).

1.4.3 Supplier and Service Providers

While the sample size for the supplier and service provider category was relatively small, the following observations are offered:

- There is an even distribution among the eight User Service bundles with regards to current agency involvement and areas of interest.
- Surprisingly, over 50% of the respondents indicated that they are not seeking partnerships to expand their business opportunities.
- All of the ITS areas of benefit were considered equally important with the exception of the reduced emphasis on reduction of pollution.

1.4.4 Research and Special Interest Group

Once again, the distribution of interest in the eight User Service bundles was very even, perhaps reflecting an over-weighting in the vehicle safety and control area. Past areas of experience for the research community reflect areas of emphasis such as Advanced Road Weather Information System (ARWIS), Commercial Vehicle Operations (CVO), and electronic payment.

The experience with research and special interest groups indicates some positive aspects associated with partnering, reflecting the academic community working with private sector consultants and suppliers, other academic institutions, and various levels of government. Many of the respondents indicated that they are looking to activities such as this study to help promote the awareness of ITS opportunities, and the importance of promoting partnerships to help develop the ITS industry in Atlantic Canada.

Most respondents indicated that they did not feel that the current education system was well suited to meeting the anticipated future staffing needs of the ITS industry. The comments indicated a need to specifically identify what those industry requirements might be with the intent of targeting programs accordingly.

2. USER SERVICES PLAN

The second step of the Atlantic Canada ITS Strategic Study was to develop a User Services Plan. This section of the report details the development of this plan, and is subdivided into four distinct but interrelated activities. Provided below is a brief description of each sub-section:

- **Needs Assessment (Section 2.1)** – It was important to develop an understanding of the current state of the transportation systems in the Atlantic Provinces, and organize the needs. Through input received at the stakeholder workshops and the web-survey, current transportation issues, problems, opportunities and gaps were identified. Section 2.0 provides a summary of the needs formulated around this information.
- **The Vision (Section 2.2)** – The development of a "vision" for ITS deployment in Atlantic Canada is an integral part of the planning process and assisted in shaping the regional ITS Strategic Plan.
- **User Service Assessment (Section 2.3)** – The needs identified in Section 2.1 were mapped to the User Services defined in the *Canadian Architecture for Intelligent Transportation Systems*. Each User Service was assessed against a number of criteria including its ability to address the identified needs. Also included in this section is a preliminary examination of the potential **"early winner"** projects identified in the initial focus group workshops convened in each Province.
- **Performance Criteria (Section 2.4)** – A set of performance criteria was established, and mapped against the primary User Services identified in the preceding section.

2.1 NEEDS ASSESSMENT

The objective of the Needs Assessment was to develop an understanding of the current state of the Atlantic Provinces transportation system, and describe and organize the needs into a consistent framework. This ensured that current issues, concerns, problems and gaps were identified and addressed on a consistent basis.

The input to the needs assessment included project team and steering committee input, the web-based survey, and the results of the four User Services focus groups.

In early November 2001, four user needs focus groups were conducted, as outlined in Exhibit 2.1.

Exhibit 2.1 – User Needs Focus Groups

Date	Location	Attendees
November 5, 2001	Moncton	25
November 6, 2001	Charlottetown	12
November 7, 2001	Halifax	14
November 8, 2001	St. John's	19

Each of the one-day sessions included:

- An introductory session to provide an overview of the draft ITS vision, the Canadian ITS Architecture, and description of the 35 User Services;
- A workshop session to validate the draft strengths, weaknesses, opportunities, and threats (SWOT) analysis for each of the eight User Service bundles;
- A User Service prioritization exercise;
- A breakout session to develop strategies and candidate projects for each of the key User Service bundles; and
- Closing presentations from participants for each of the key User Service bundles.

Appendix C provides a detailed summary report for the focus group sessions, including the agenda and attendance listing. The following sections provide a high level overview of the results, which helped to shape the development of the Step 2 User Service Plan.

2.1.1 Focus Group Attendance

As a general comment, the four sessions attracted a diverse range of stakeholders who actively participated in the sessions. The Moncton session included a particularly broad range, namely three levels of government, private sector owner/operators, tourism, academia, telecommunications, RCMP, and strong representation from the commercial carriers. Key areas of discussion centred around the needs and applicable user services for commercial vehicle operations and traveller information.

The Charlottetown session provided good input on bus operations, emergency services, and small business perspectives. The discussion in this focus group centred on needs associated with community transit, and co-ordinated emergency response to incidents.

The Halifax session was characterized by a high level of awareness and experience with ITS applications. Key stakeholder groups represented included intermodal operations, transit, electronic payment and trucking. Many of the participants at the Halifax focus group have experience with ITS deployment. Key areas of discussion centred on electronic payment, traffic management, and intermodal goods movement.

The attendance at the St. John's focus group reflected more of a public sector weighting with representation from three levels of government and from telecommunications service providers. Key areas of discussion included commercial vehicle operations, and rural incident management.

2.1.2 SWOT Analysis

The review of the SWOT analysis exercise was very helpful in prompting stakeholders to think about the existing characteristics of the region (i.e. strengths and weaknesses), as well as identifying future considerations (i.e. opportunities and threats). Substantial edits/additions were undertaken to the SWOT analysis forms included in the User Service Plan. Some particular areas included identification of existing ITS applications and plans for deployment, which are reflected in strengths and opportunities. Many of the comments on threats are centred on the lack of ITS awareness and the associated inability to secure funding. Many of the comments on future opportunities focussed upon integration and interoperability among agencies.

2.1.3 User Services and Early Winners

The participants identified the User Services most relevant to their needs and areas of interest, utilized worksheets to analyze these User Services in the context of the Atlantic Region, and identified potential early winner projects for further consideration under this study. A detailed list of the priority User Services and associated candidate products is included in Appendix D and further discussed in Section 2.3.

Based upon the input solicited through the project team and steering committee input, the web-based survey, and the focus groups, a number of current and future transportation needs were established. Exhibit 2.2 includes a summary of the identified needs. For each of these needs, a summary page has been prepared to provide a synopsis of the following:

- Description;
- Related trends;
- Priority;
- Potential stakeholders;
- Associated User Services; and
- Prospectus.

Accordingly, the following pages include the summary sheets for each identified need. A review of these profiles underscores some key themes for the Atlantic Provinces. These themes include priorities involving the efficient movement of goods on-road, at terminals and across borders, optimized response to rural traffic incidents, optimized management of the infrastructure, and the provision of a seamless, accessible transportation network for travellers. In order to achieve these priorities, there is a series of needs focussing on improved real-time data collection, such as road weather conditions, improved inter-agency coordination and information exchange and improved interactive interfaces with travellers and carriers.

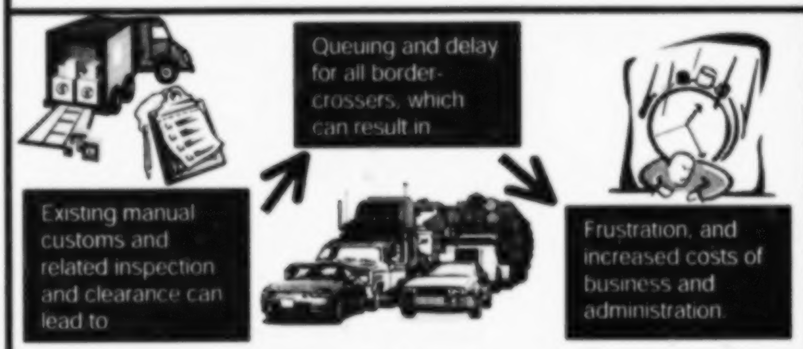
Exhibit 2.2 – Identified Transportation Needs

Need	Description
1	Expedited Border-Crossing Inspection and Clearance for Commercial Vehicles
2	Reduce Rural Road Collisions Through Early Detection of Adverse Conditions
3	Reduce the Incidence, Severity and Cost to the Community of Road Collisions
4	Improved Safety in Road Work Zones
5	Enhanced Management of Winter Maintenance Operations
6	Expedited Weight, Credential, and Safety Checks for Commercial Vehicles

Need	Description
7	Road Emergency Notification and Information System for Rural Areas
8	Improved Ferry Services, Particularly Nova Scotia – Newfoundland
9	Provide Travel Incentives and Traveller Information to Promote Tourism in Atlantic Canada
10	Enhanced Safety and Security for Travellers and for Transportation Operators and Facilities
11	Enhanced Ability to Detect, Verify, and Respond to Incidents on Major Roadways
12	Enhanced Tracking and Real-Time Management of Containers and Other Goods at Intermodal Terminals
13	Real Time Transit Service Monitoring and Public Information
14	Improve Management of Fleet Transportation Services
15	Real-Time Management of Parking Operations

EXISTING NEED

- The border-crossing process for commercial vehicles potentially involves a complex set of checks and inspections related to customs, immigration, safety, agriculture/food/drug and environmental regulations. Up to 6 paper documents may need to be presented and checked at the border.
- A delay study at the St Stephen / Calais border crossing showed that between 70 and 95% of all commercial vehicles crossing the border are subject to delay. Delays typically range between 2 and 30 minutes with occasional delays greater than 30 minutes. In the case of St Stephen, resulting delays to other traffic can cause queuing through the downtown area.
- There are 16 border crossings between New Brunswick and Maine and an international ferry crossing between Nova Scotia and Maine.
- ITS facilities being considered for a new border-crossing facility at St Stephen, NB / Calais, ME include weigh-in-motion (WIM) scales, transponder readers, safety information systems, International Trade Data Systems (ITDS), and truck driver information kiosks.
- There is an existing need to improve border security and enhance safety at border crossings.



Existing manual customs and related inspection and clearance can lead to

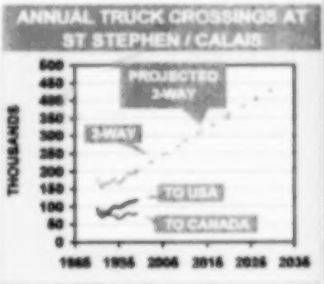
Queuing and delay for all border-crossers, which can result in

Frustration, and increased costs of business and administration.

TRENDS

- The three busiest border crossings to the USA are at St Stephen, Milltown, and Woodstock NB. Average daily truck volumes (2-way) at these locations are 302, 243 and 500 respectively. Crossing at these locations represent 2/3 of the southbound cross-border truck trips for the Atlantic Provinces.
- Two-way truck traffic at the New Brunswick / Maine border is expected to more than double by 2030 (3.8% per year uncompounded).
- Canada and the US signed The Canada-US Smart Border Declaration (December 12, 2001) which refers to initiatives that would use ITS to improve security at international border crossings.

ANNUAL TRUCK CROSSINGS AT ST STEPHEN / CALAIS



PRIORITY OF NEED

- This is a high priority need. Construction of a new bridge and border crossing facility at St Stephen / Calais is currently being pursued. Enhanced clearance processing could provide interim relief until the new crossing is in place and would maximize the efficiency of the new facility if implemented at start up.
- Increased border security in the context of anti-terrorist initiatives will likely increase inspection requirements and the need for enhanced efficiency.

Need #1
Expedited border-crossing inspection and clearance for commercial vehicles.

Currently, six different documents have to be completed and sent with the trucker, who presents these documents at the US border, at which point the paper documents are matched up with the electronic documents sent to the border by the shipper. This is another good argument for speeding up the adoption of suitable ITS technologies.

STAKEHOLDERS:

- Canada Customs and Revenue, U.S. Customs
- Provinces, State of Maine
- Carriers and shippers
- Other border traffic

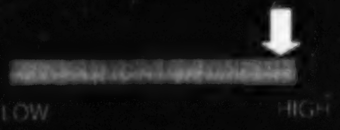
USER SERVICE:

- Commercial Vehicle Electronic Clearance
- Automated Dynamic Warning and Enforcement

PROSPECTUS:

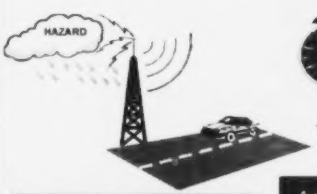
- All indications point to a need for greater efficiency to accommodate increased demand for commercial vehicle border-crossings and enhanced inspection requirements without increased delay and cost.

PRIORITY OF NEED:

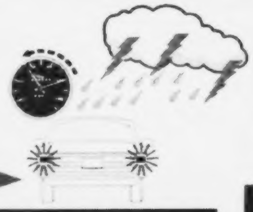


EXISTING NEED

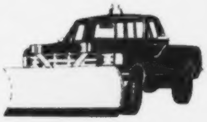
- Hazardous road conditions coupled with adverse weather conditions in the form of floods, winter storms, forest fires and heavy fog can have a crippling effect on Atlantic Canada road travel.
- Opportunities to maintain safe road conditions prior to, during or immediately following an adverse change in driving conditions would reduce the effect of the potentially hazardous conditions.
- Opportunities to advise motorists in advance of their approach to the hazardous area would alert them and instill more cautious driving or avoidance of the area.
- There are approximately 64,000 kilometres of highway in the Atlantic Region



Early detection of hazard or adverse condition



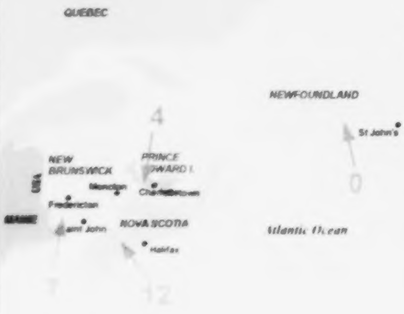
Advance warning to motorists would reduce collision potential



Early response to road maintenance needs would improve driving conditions

TRENDS

- A proposal for a National Road Weather Information System (RWIS) has been approved by 9 provinces (Quebec has agreed in principal) and is now before the Federal government (Transport Canada & Environment Canada).
- A new state-of-the-art Dopplar Radar system has been installed across Canada (completed in 2001)
  - 5 of the Dopplar Radar sites are in Atlantic Canada with near real time single site and composite images available on the Web.
- Nova Scotia recently signed a 3 year supply and install contract for 18 ARWIS sites (6 sites a year for 3 years).
- Prince Edward Island has a total of 4 RWIS stations to support its winter maintenance program.
- The new Fredericton / Moncton Highway will have 6 ARWIS sites along it to support the winter maintenance activities this winter



Number of ARWIS sites in 2001

PRIORITY OF NEED

- This is a high priority need. With the prevalence of severe weather and the extensive use of rural roads, road safety should be enhanced as opportunities for this are identified.

ALL RURAL ROADS IN ATLANTIC CANADA

ANTIC PROVINC

Need #2
Reduce rural road collisions through early detection of adverse conditions.

Early detection of hazardous road conditions, advance warning to motorists and response by road maintenance staff are means of improving road safety.

STAKEHOLDERS:

- All road users
- Road agencies
- Emergency services

USER SERVICES:

- Traveller Information
- Environmental Conditions Management
- Operations and Maintenance
- Automated Dynamic Warning and Enforcement
- Emergency Vehicle Management
- Weather and Environmental Data Management
- Incident Management
- Emergency Notification and Personal Security
- Disaster Response and Management

PROSPECTUS:

- Increasing use of existing rural roads, increasing vehicle speeds and limited improvements to road infrastructure highlight the importance of road safety improvements.

PRIORITY OF NEED:

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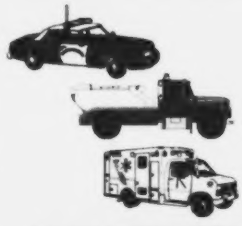
EXISTING NEED

- Potential issues for priority action are: speeding; fatigue; seatbelt use; road design; quality and condition; drivers in high risk; age groups; motorcycle, bicycle and pedestrian safety; heavy vehicle collisions; drinking & driving; drugs and driving and occupant protection.
- Transport Canada 's Road Safety Vision 2001 goal is to have the safest road in the world however Canada is ranked ninth in the number of road user fatalities per 10,000 registered vehicles.
- Reduction of fatal motor vehicle collisions is specifically targeted by all Provinces, including both rural and urbanized areas.
- Possible opportunities to address include:
  - On-board applications (eg. Driver monitoring)
  - Infrastructure applications (eg. Red-light cameras)

Road safety continues to be a high priority

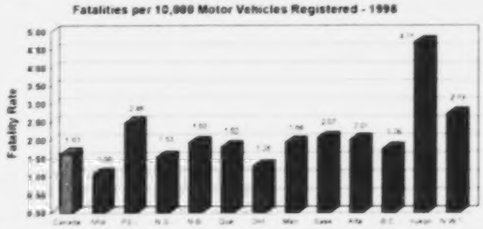


Efforts are made to reduce impacts of road collisions

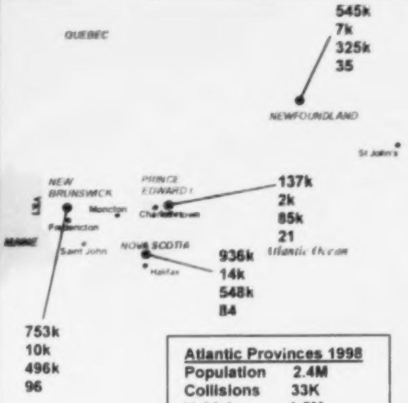
Outcomes of vehicle collisions are not at an acceptable level

TRENDS

- Road collisions account for over 90% of all transportation related deaths.
- Cost of road collisions in 1998 to Canadian economy was $10.5 Billion.



- The fatality rate in auto collisions in 3 of the 4 Atlantic Provinces exceeded the average rate for Canada in 1999.



Atlantic Provinces 1998	
Population	2.4M
Collisions	33K
Vehicles	1.5M
Fatalities	236

PRIORITY OF NEED

- This is a high priority need. The risks of road use continue to decline and continuing effort should be placed on achieving further declines.

Need #3

Reduce the incidence, severity and cost to the community of road collisions.

Road related collisions cost the community billions of dollars, pain and suffering and is a top priority to all of us.

STAKEHOLDERS:

- All government agencies
- Emergencies agencies
- All commercial sectors
- The communities of Atlantic Canada and beyond
- Health Services

USER SERVICES:

- Traffic Control
- Traveller Information
- Incident Management
- Environmental Conditions Management
- Operations and Maintenance
- Automated Dynamic Warning and Enforcement
- Emergency Vehicle Management
- Emergency Notification and Personal Security
- Disaster Response and Management
-

PROSPECTUS:

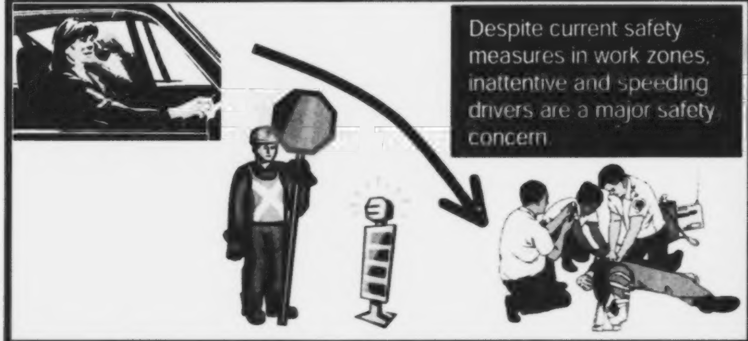
- Over the past 10 years to 1998, traffic deaths have decreased by more than 29%, while drivers licensed have increased 20%.

PRIORITY OF NEED:

⬇

EXISTING NEED

- Work zones associated with road construction often involve lane reductions, speed reductions, or other modifications to driving conditions.
- Inadequate advance warning, driver inattention, possibly due to cell-phone use or other in-vehicle distractions, or unresponsiveness with respect to work-zone driving conditions represent a substantial safety risk to both road users and construction personnel. Driving too fast, following too close, and the resulting need for sudden stops and speed changes are key factors in many work-zone collisions.
- Although enforcement is a major consideration, enhanced visibility/audibility and clarity of advisory messaging, in combination with improved traffic control and enforcement in advance of and within work-zones would play a significant role in improving work-zone safety.
- Improving the level of information available to the driver concerning traffic conditions within the work zone could reduce frustration and help increase compliance with reduced speed limits. Another possibility is feedback to drivers on their actual speeds.



Despite current safety measures in work zones, inattentive and speeding drivers are a major safety concern.

TRENDS

Based on US data:

- The number of people killed in highway work zones is at an all-time high.
- Between 1995 and 1999, motorists accounted for 84 percent of work zone fatalities. However, fatality rates for highway workers are twice that of other types of construction.
- Aging road infrastructure means increased maintenance and rehabilitation activity.
- Trend is to crash trucks, attentuators, advance warning and more comprehensive strategies for delineation and lane closures.

PRIORITY OF NEED

- This is a high priority need.
- Safety is a high-priority concern.

[illegible] work zones on [illegible] but [illegible]

Need #4

Improved safety in road work zones.

Road sign written in a child's hand... "Please slow down, my daddy works here."

Most work-zone collisions occur because of driver inattention and speeding. Three top things are visibility, visibility, visibility.

STAKEHOLDERS:

- Provincial and municipal transportation agencies
- Travelling public
- Construction contractors

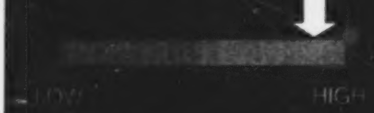
USER SERVICES:

- Operations and Maintenance
- Traveller Information
- Automated Dynamic Warning and Enforcement

PROSPECTUS:

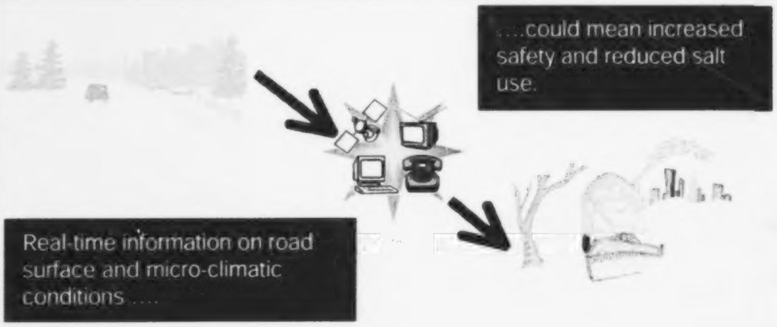
- Improving driver awareness through provision of work-zone status and traffic control information would help to mitigate the congestion and safety impacts associated with roadway construction, maintenance and rehabilitation work.

PRIORITY OF NEED:



EXISTING NEED

- Variable and changeable weather conditions across a dispersed road system in Atlantic Canada means that the planning and dispatching of winter maintenance operations is a difficult task.
- Today's winter maintenance operations rely on dispatcher/operator experience and limited information on weather and road surface conditions in attempting to keep roads clear and safe within limited resources.
- Lack of real-time information on micro-climatic variations leads to a requirement for a conservative approach to salting, sanding, or plowing operations, meaning that some critical areas may not receive timely attention while other, less critical areas may be over-maintained.
- Improved information on weather and road surface conditions could allow more precisely targeted maintenance. Safer roads, more timely maintenance, and a reduction in salt use and cost to achieve the same or higher levels of maintenance effectiveness are possible with improved decision support and technological advances in maintenance methods.

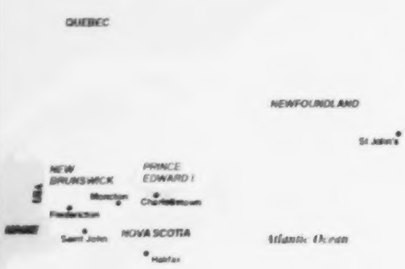


Real-time information on road surface and micro-climatic conditions ....

....could mean increased safety and reduced salt use.

TRENDS

- The trend in winter maintenance is towards better management of resources and improved methods.
- Environment Canada has indicated that they will declare road salt to be toxic to the environment. Effective salt management will therefore be a priority item.
- Advanced road weather information systems can provide early warning of winter storms and allow maintenance personnel to pre-treat roads, thus preventing snow from binding to the pavement and reducing salt use by at least 20%.



PRIORITY OF NEED

- This is a high priority need.
- The Trans-Canada Highway is seen as a high priority need due to traffic volume and its role in support of trade and commerce.

Relevant to all roads and [illegible]

ATLANTIC PROVINCES [illegible]

Need #5
Enhanced management of winter maintenance operations.

More precisely targeted winter maintenance activity means safer roads and reduced maintenance costs.

STAKEHOLDERS:

- Provincial and municipal transportation agencies
- Travelling public
- Road contractors

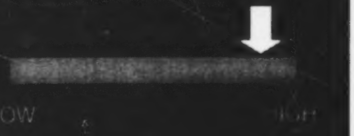
USER SERVICE:

- Environmental Conditions Management
- Operations and Maintenance
- Weather and Environmental Data Management

PROSPECTUS:

- The availability of more comprehensive weather and road surface information would improve road safety and facilitate more effective use of increasingly constrained maintenance resources.

PRIORITY OF NEED:



EXISTING NEED

- Existing weigh stations are off-line and do not permit high-speed truck passes, resulting in delay to truckers and potential for queuing onto the highway and attendant ramp and mainline safety problems. The absence of information sharing may mean that some trucks may be weighed more than once per trip while others may not be weighed at all.
- Existing safety inspections (driver and vehicle condition and safe loading) are accomplished manually and cannot take advantage of information sharing among inspectors and jurisdictions (such as the SAFER system). Compliant carriers with good safety records may be subject to unnecessary delay while the relatively small percentage of carriers with poor safety records may not be adequately inspected. When weigh stations close temporarily due to congestion and delay, commercial vehicle traffic is not adequately inspected.
- Document checks (driver's license, hours of service log, trip inspection reports, certificate of dangerous goods handling, vehicle operating authority, registration and insurance) are accomplished manually and without information sharing that could significantly reduce inspection time and paperwork.

Lack of electronic pre-clearance at weigh/inspection stations... → ...causes excess delay and cost.

TRENDS

- Commercial Vehicle Operations (CVO) are becoming a subject of attention across Canada.
- A CVO study is being carried out for British Columbia involving major routes and border crossings with the objective of including weigh-in motion, tolling, truck safety and inspection clearance on one transponder.
- Transport Canada has a study underway for Canadian standardization of electronic collection and information transfer.
- Major border crossings such as the Peace Bridge (Ontario, Canada – New York, USA) are using their own transponders for truck preclearance and tolling.

PRIORITY OF NEED

- This is a medium-to-high priority. There is potential for significant enhancement to the procedures for weighing commercial vehicles and for inspection in relation to truck safety and credentials. The resulting time savings, combined with more effective and efficient inspection and regulation suggests the benefits of early implementation.

There [illegible]

ATLANT [illegible]

Need #6
Expedited weight, credential, and safety checks for commercial vehicles.

STAKEHOLDERS:

- Provincial transportation departments
- Carriers and shippers
- Public Safety Departments

USER SERVICE:

- Commercial Vehicle Electronic Clearance

PROSPECTUS:

- Electronic clearance processes may be more efficient than increased physical capacity of weigh stations in the face of increasing commercial vehicle traffic.

PRIORITY OF NEED:

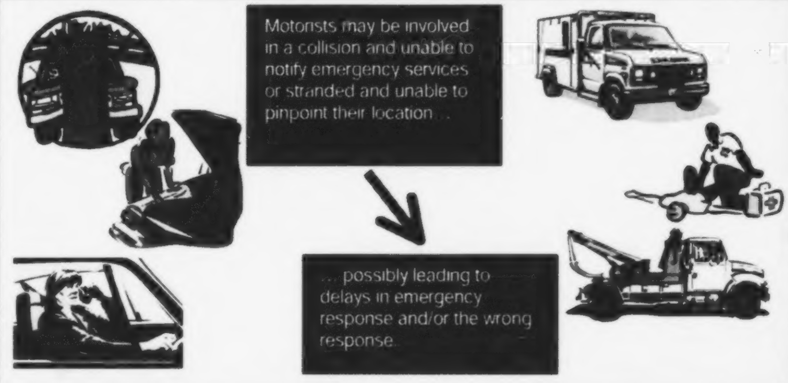
EXISTING NEED

- There are several aspects to this need for improved emergency notification and information.
- Drivers may be involved in a collision, unconscious, and unable to notify emergency services, provide their location, and describe their situation, delaying effective response.
- Motorists may be stranded by a breakdown or uncertain of their personal security but unable to pinpoint their location for a response team.
- National Highway Traffic Safety (US) data yields the average response times below.

	URBAN	RURAL
Crash to notification	3.9 min	8.2 min
Notification to response	6.2 min	11.4 min
Response arrival to hospital	25.5 min	36.1 min

These average times mask potentially much higher notification and response times associated with remote areas.

- The elapsed time between a collision and arrival of a response team may mean the difference between life and death.



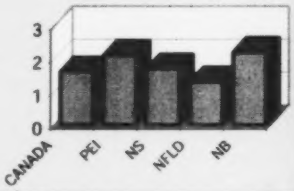
Motorists may be involved in a collision and unable to notify emergency services or stranded and unable to pinpoint their location ...

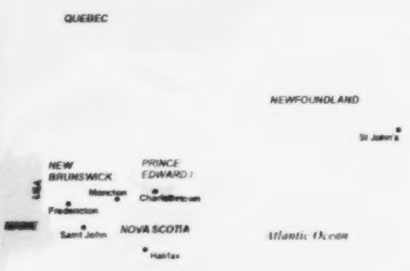
... possibly leading to delays in emergency response and/or the wrong response.

TRENDS

- The fatality rate in auto collisions in 3 of the 4 Atlantic Provinces exceeded the average rate for Canada in 1999. In 1998 2 of the 4 Atlantic Provinces exceeded the average Canadian fatality rate.
- Typically, the number of collision fatalities on rural roads exceeds that on urban roads by almost 2 to 1.
- Annual fatalities have been declining across Canada although one fatality is one too many.

FATALITIES PER 10,000 VEHICLES REGISTERED (1999)





PRIORITY OF NEED

- This is a medium-to-high priority since there is potential to save lives by reducing emergency notification and response times associated with traffic collisions. The potential to improve traveler security or respond more quickly to stranded motorists would help offset the difficulties associated with traveling on remote, rural roads.

Need #7
Road emergency notification and information system for rural areas.

The first hour after a crash is the most crucial in a severely injured persons outcome. This has been referred to as the 'Golden Hour'

STAKEHOLDERS:

- Rural residents and drivers
- Emergency services (police, fire, ambulance, etc)
- Hospitals and other caregivers

USER SERVICE:

- Traffic Control
- Emergency Notification and Personal Security
- Disaster Response and Management

PROSPECTUS:

- Although the number of fatal vehicular collisions annually has been declining steadily across Canada, there is potential to save lives across Canada.

PRIORITY OF NEED:

Need #8

Improved ferry services, particularly Nova Scotia - Newfoundland.

Limited ferry capacities and manual processes of vehicle processing have a significant bearing on the attractiveness of ferry travel.

STAKEHOLDERS:

- Road Users
- Communities of Atlantic Canada
- Carriers / Shippers
- Ferry services operators
- Tourism industry
- Business Community
- Canada Customs and Revenue Agency

USER SERVICES:

- Traffic Control
- Traveller Information
- Traveller Services and Reservations
- Electronic Payment Services
- Commercial Vehicle Electronic Clearance

PROSPECTUS:

- Atlantic Canada requires efficient and capacity – optimizing ferry services, particularly to Newfoundland to accommodate growth in demands and to ease road demands.

PRIORITY OF NEED:

⬇

EXISTING NEED

- Capacity problems, rates and schedules, and service quality issues are areas of concern in regards to Gulf Ferry service.
- Some Atlantic Communities rely heavily on ferry service as their primary access to points outside the community.
- Trucking industry is concerned that there are increasing numbers of commercial units and tractor-trailer lengths have increased from 45-48 Feet to 53 Feet.
- Gulf Ferry capacity constraints may delay trucks 1-2 days during peak tourism season.
- Newfoundland requires a guaranteed level of stability for its Ferry service.

Need for advance information regarding routes, schedules, space availability, and reservations

Vehicle processing to improve use of available capacity and faster loading.

TRENDS

- In July and August 1998 Marine Atlantic operated at full capacity in 186 of 265 crossings of the two Gulf Superferries.
- There is a growing trend towards web-based and centralized bookings and/or reservations.
- Improved ferry technologies including jet hovercrafts are available, although costly.

PRIORITY OF NEED

- This is a medium priority need. The highest need relates to access to / from Newfoundland since other areas have mainland access.
- Gulf Ferry service is critical to the economy of Newfoundland.

MAJOR FERRY SERVICES

ATLANTIC PROVINCES

Need #9
Provide travel incentives and traveller information to promote tourism in Atlantic Canada.

Visitors in Atlantic Canada want a convenient means of searching for attractions, accommodations, food services and many other destinations.

STAKEHOLDERS:

- Tourists
- Chambers of Commerce
- Provincial Departments of Tourism
- Canadian Automobile Association

USER SERVICES:

- Traveller Information
- Traveller Services and Reservations

PROSPECTUS:

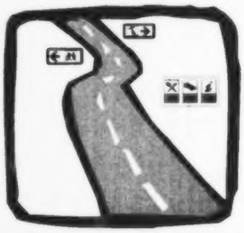
- Growth in Atlantic Canada tourism will continue and accelerate with improvements to information dissemination.

PRIORITY OF NEED:

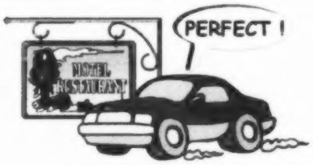
⇩

EXISTING NEED

- Visitors who are unfamiliar with Atlantic Canada require information about attractions, accommodation, restaurants, directions, route guidance and many other services.
- Travelers en-route are not able to access information regarding all potential destinations, other than those advertised in tourist books and brochures and at tourist offices (subject to seasonal and daily hours)
- Businesses that derive potential livelihood from tourism require advertising through one or more media, at significant costs.
- Tourism was identified among the top 3 growth sectors for Atlantic Canada, building on the strength of the region.



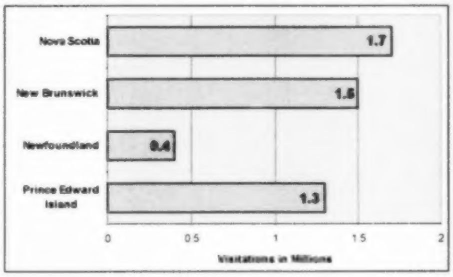
Need to inform unfamiliar visitors



Advertising benefits tourists and local businesses

TRENDS

- 3.5 million non-resident visitations to Atlantic Canada in 1996 and an increase of 40% by 1999 to 4.9 million.
- PEI increase was 60% between 1996-1999.



PRIORITY OF NEED

- This is a medium priority need. The need of tourists to seek information in a convenient manner is important to them and critical to support businesses in the tourism industry.

EXISTING NEED

- Personal safety and security issues are receiving much greater attention both in terms of media reporting and in initiatives to address these issues.
- One key aspect involves the on-board security and safety of passengers travelling on public transport services (buses, school buses, taxis, trains, ferries). Related to this is safety and security at terminals (bus-stops, parking lots, ferry terminals, airports, etc). This need primarily relates to surveillance and monitoring and emergency notification and response functions.
- Recent terrorist activity suggests that the security of the facilities themselves is also an issue requiring action. This would include the safety and security of the operators (bus drivers, taxi drivers, etc)
- Another perspective is that of the safety of non-vehicular users of the road system – pedestrians and cyclists, including those with perceptual or physical limitations. This need might involve surveillance, detection, and passive or active warning and advisory functions.

Increasing need for and emphasis on traveler, operator and facility safety and security necessitates new approaches.

TRENDS

- Use of closed circuit television monitoring, panic alarms for facilities, personnel and users. (e.g. taxis, transit, parking facilities.)

PRIORITY OF NEED

- This is a medium priority need.
- There is a renewed emphasis on the safety and security aspects of this need that demand attention in the short term.

ATLANTIC PROVINCES

Need #10 Enhanced safety and security for travellers and for transportation operators and facilities.

STAKEHOLDERS:

- Operators of public transportation facilities and services
- Province, municipalities
- The traveling public

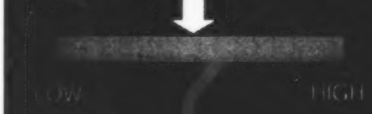
USER SERVICES:

- Emergency Notification and Personal Security
- Disaster Response and Management

PROSPECTUS:

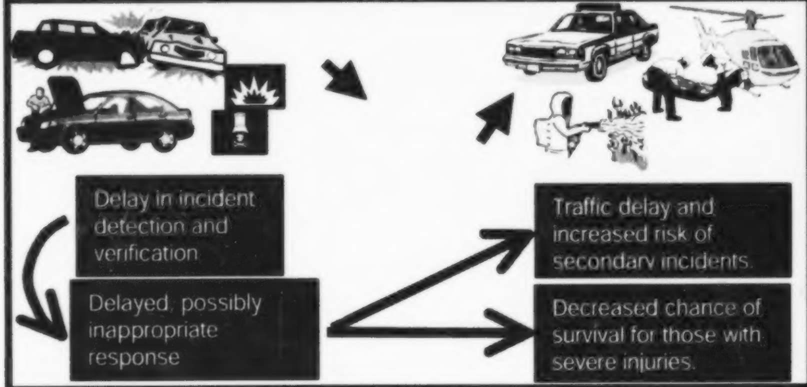
- Increased emphasis on personal safety and security and increased potential for terrorist and criminal activity affecting travellers suggests an increased need for surveillance, alarm, and protection systems.

PRIORITY OF NEED:



EXISTING NEED

- Incidents on major roadways generate a multi-faceted need that includes enhanced incident detection and verification, coordinated response and reduced response times, and coordinated management of the incident site and of information provided to motorists..
- The first need is for quick detection of an incident and verification of its nature and location. The proliferation of cellular phone use has created an informal incident detection system but this must be considered supplementary to a more formalized system of detection and verification.
- The second need is for rapid deployment of a response appropriate to the incident, requiring a coordinated management and communication system. The first hour after a collision is a critical factor in the survival of severely injured collision victims. The presence of hazardous materials requires more specialized response capabilities.
- The third need is for effective management of the incident site, including restoring normal operation as soon as possible consistent with medical and police requirements. This reduces the risk of secondary incidents. Coordinated with site management is the provision of information to motorists, advising them of possible delays, alternative routes, etc.



Delay in incident detection and verification

Delayed, possibly inappropriate response

Traffic delay and increased risk of secondary incidents.

Decreased chance of survival for those with severe injuries.

TRENDS

- Improved incident detection and response capabilities are saving lives on highways. Trend is towards mayday systems for rural ITS. This may use a combination of cell phone, GPS, telematics and 911.
- One estimate has the cost of congestion related to incidents across the USA pegged at approximately $75 billion for 2005.

PRIORITY OF NEED

- This is a medium priority need. Emergency services already exist and provide acceptable response within the existing context.

[illegible]

[illegible]

Need #11 Enhanced ability to detect, verify, and respond to incidents on major roadways.

STAKEHOLDERS:

- Provinces, municipalities
- Emergency services
- Road users

USER SERVICES:

- Incident management
- Emergency Vehicle Management
- Disaster Response and Management

PROSPECTUS:

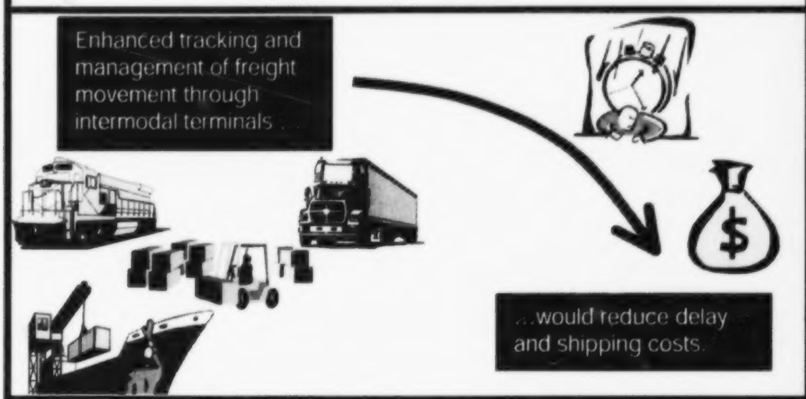
- Increased emphasis on safety and the staggering cost of incident-related congestion suggest a definite need for enhanced incident detection, response, and management.

PRIORITY OF NEED:

Need #12
Enhanced tracking and real-time management of containers and other goods at intermodal terminals.

EXISTING NEED

- Enhanced tracking and management of the movement and storage of containers and other forms of cargo within intermodal terminals would facilitate inspection, loading, and shipping. In turn, delay and delivery costs would be reduced.
- To remain competitive among North American Atlantic seaboard facilities and make optimum use of existing physical infrastructure and capacity, the efficiency of handling and administering intermodal cargo movements should be enhanced.

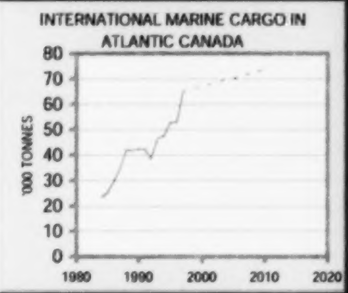


Enhanced tracking and management of freight movement through intermodal terminals . . .

. . . would reduce delay and shipping costs.

TRENDS

- International and domestic marine cargo loaded and unloaded in Atlantic Canada are expected to grow at 0.85% and 2.03% per year respectively, an overall average of 1.04%.
- The container component of intermodal cargo handling is expected to grow at 4.0% annually.
- Financial considerations (fees) may result in transfer of operations from smaller to larger ports, increasing demand at these locations.


INTERNATIONAL MARINE CARGO IN ATLANTIC CANADA

PRIORITY OF NEED

- This is a medium priority need.
- Questions surrounding the ability of New York/New Jersey to be the port of choice for the northeast and Midwest USA in the short-to-medium term suggest that operations at Halifax be enhanced to maintain competitiveness.
- The Port of Halifax is expected to reach capacity by approximately 2002-2003.

ATLANTIC PROVINCES

STAKEHOLDERS:

- Canada Customs and Revenue, U.S. Customs
- Provinces, State of Maine
- Carriers and shippers

USER SERVICE:

- Information Warehousing
- Intermodal Freight Management

PROSPECTUS:

- Increased demand for freight movement through intermodal terminals will require more efficient handling to ensure continued competitiveness.

PRIORITY OF NEED:

Need #13

Real time transit service monitoring and public information.

Effects of transit service delays, overloads and incidents should be mitigated quickly and passengers notified

STAKEHOLDERS:

- Transit Patrons
- Transit Agencies
- CUTA

USER SERVICES:

- Traveller Information
- Public Transport Management
- Electronic Payment Services

PROSPECTUS:

- The use of new technology in public transit continues to increase attractiveness of transit in urban areas.

PRIORITY OF NEED:

⬇

EXISTING NEED

- There are trends of decreasing ridership, reduced Provincial incentives for expansion, lack of interagency / system integration and reduced funding.
- Success in public in transit is through:
  - Integration of operations (ie. good connections, coordinated timetables, passenger information, service frequency).
  - Efficient passenger transfers (ie. short walk distances).
- New intelligent technologies are the only means of providing integration.
- Operational transitioning to new technologies is challenging (eg. from tokens and paper tickets to electronic ticketing).
- Various public transport services are operating completely independently and should work towards a seamless service in terms of consistent information, schedules, vehicle and mode transfers, etc.

Transit schedules are often not enough

Passengers require accurate information and reliable services

TRENDS

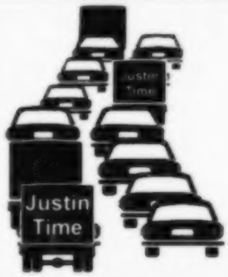
- Transit ridership changes 1999-2000.
  - Fredericton, NB 703,420 → 755,494 +7.4%
  - Halifax, NS 11,998,985 → 12,509,661 +4.3%
  - Saint John, NB 2,494,574 → 2,491,001 -0.1%
  - Saint John's, NF 3,252,865 → 3,176,982 -2.3%
  - Canadian average → +3.4%

PRIORITY OF NEED

- This is a medium priority need. The current transit operations should continue to introduce service improvements to retain or increase ridership.

EXISTING NEED

- Challenges of providing transportation services are increasing due to an ever-changing marketplace
  - Increasing customer demand for convenience and service reliability
  - Increasing competitiveness for similar services in the local, national and international marketplace
  - Delivery timeframes or windows are expanding beyond 8 to 5
  - Understanding where fleet vehicles are and where they've been is critical to manage a transportation service
- There is a precedent for developing these systems, including:
  - AVLS in Halifax for passenger bus fleets
  - ITS fleet messenger systems for trucks



Reliability of service is critical and difficult to achieve

Knowing location of fleet vehicles can trigger decisions

NOT ACCEPTABLE !

Customers demand satisfactory service

TRENDS

- Fleet management is becoming more focused on the "strategy" of service delivery and optimization of that service and is moving to real time deliveries.
- Transportation companies are creating business plans that apply available technologies to provide quality customer service.
- Technologically astute customer base is demanding a higher level of convenience.
- World marketplace is already advancing in transportation services and Atlantic Canada wants to remain competitive.
- Four out of the top 20 Canadian trucking companies (in term of No. of employees) have headquarters in Atlantic Canada.
- Gross revenue of for-hire truck carriers in the Atlantic Region exceed $1 Billion annually.

PRIORITY OF NEED

- This is a medium priority need. The existing situation may lead to inefficiencies: slow response / delivery times and unreliable services.

Need #14
Improve management of fleet transportation services.

Efficiency and viability of freight and transit fleets depend on vehicle tracking, routing, scheduling, dispatch communications and traffic regulations.

STAKEHOLDERS:

- Trucking industry
- Emergency services
- Public Works Department
- Taxi companies

USER SERVICES:

- Public Transport Management
- Commercial Vehicle Electronic Clearance
- Commercial Fleet Management

PROSPECTUS:

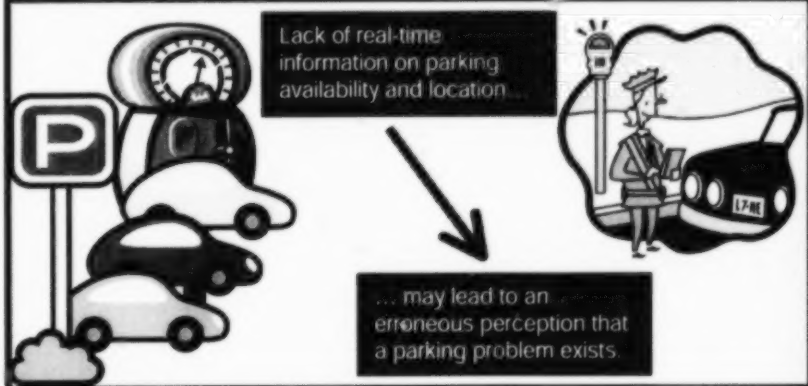
- Transportation services must continue to provide improvement to satisfy customer expectations.

PRIORITY OF NEED:

⬇

EXISTING NEED

- Inability to provide information on the availability and location of parking spaces (wayfinding) may prevent full utilization of parking assets. The need for more effective parking management is most relevant to parking in conjunction with major events, and shopping and tourist destinations, where parking demand may be accommodated at a variety of locations. However, this need may also exist with respect to other major generators such as institutions (eg. universities) and transportation terminals (airports, ferry terminals etc.)
- Habitual parking situations, such as employee parking at places of work would not typically exhibit this type of problem.
- Drivers trying to find one of the last 5% of parking spots available may experience frustration and perceive a parking problem despite the fact that not all parking spaces may be occupied. Furthermore, driving around (trolling) in search of a parking space contributes to traffic congestion and excess vehicle emissions.
- Perceived lack of parking may reduce the attractiveness of shopping and tourist destinations.



Lack of real-time information on parking availability and location...

... may lead to an erroneous perception that a parking problem exists.

TRENDS

- Examples of major events include the Vikings events at L'Anse aux Meadows.
- There may only be parking issues with respect to events / festivals, to be considered on a case by case basis.

PRIORITY OF NEED

- This is a low-to-medium priority need as the number of potential applications in the Atlantic Region is limited.
- Specific situations may warrant a higher priority depending upon circumstances.

[illegible]
shopping areas, tourist [illegible]

ATLANTIC PROVINCES INTELLI[illegible]

Need #15
Real-time management of parking operations.

Inability to locate available parking spots may reduce the attractiveness of the region's retail and tourism trade.

STAKEHOLDERS:

- Municipalities
- Parking operators
- Travelling public

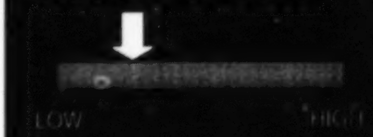
USER SERVICE:

- Traveller Services and Reservations
- Traveller Information
- Electronic Payment Services

PROSPECTUS:

- As urban space becomes increasingly constrained and parking resources must be pooled to accommodate larger demands, efficient management of parking assets assumes greater importance.

PRIORITY OF NEED:



2.2 *VISION*

It is important to capture the user needs of the region in a common "ITS Vision" which stakeholders can identify with, and work towards. The vision becomes an integral part of the planning process, helping to shape the regional ITS Strategic Plan. The Needs Assessment developed profiles of fifteen "needs" of the Atlantic Provinces. The next challenge was to translate these various "needs" into a vision.

A "vision" can consist of one short statement or paragraph. Conversely, it can be a more extensive document, providing **goals**, objectives, and a series of "views" from different perspectives. This section begins with "a vision for the future". It leads to a summary of typical ITS goals, followed by a series of "views":

- The **"User Views"** present "a day in the life" in the Atlantic Provinces, demonstrating how the users will benefit from the functions of the different surface transportation services;
- The **"Business View"** approaches the ITS strategy from the perspective of the different roles of the stakeholders;
- The **"Procurement View"** suggests the potential contracting, partnering and funding options for deploying ITS; and
- Finally, the **"Process View"** describes how the plan can evolve and change as new technologies, User Services and systems are developed.

2.2.1 A Vision for the Future

Over the coming twenty years, technology performs a key role in improving the performance of transportation systems in the Atlantic Region. People and goods move seamlessly throughout the region. Information technology is a driving force behind how people get to work, do business, and sell and transport goods. The role of the public transportation right-of-way has expanded to include a telecommunications backbone making "e-solutions" for mobility and commerce possible in Atlantic Provinces.

Commerce will thrive in Atlantic Provinces. Commercial vehicles will be able to pay tolls and tariffs electronically at all New Brunswick - Maine border crossings. Similarly, all vehicles will be able to pay tolls electronically. The same technology will be available to pay parking fees and pay for access to recreational areas. Private sector retailers will choose to take advantage of the technology to accept payment at drive-through facilities. Electronic payment will also be a boon to public transit travel. "Smart cards" can be used to move seamlessly from one transit system to another.

All across the Atlantic Provinces, road and weather information systems will collect real-time data on road and weather conditions. The information will be made available to travellers through advance warning systems, and traveller information systems. It will also be used by road maintenance crews to efficiently maintain the road conditions at a safe level.

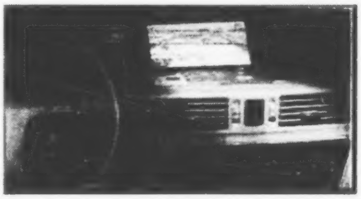
Despite the widespread deployment of safety systems, incidents will still occur, but in far fewer numbers. When an incident does occur, emergency services will automatically be contacted regarding the location of the incident. Emergency vehicle drivers will be able to select the fastest route to the incident site, based upon real-time travel information, and dynamic route guidance in the vehicle. If the incident involves a spillage of hazardous material, a message will be sent electronically to emergency management centres providing details on the type of material. The traffic management systems will implement special plans to clear the route of traffic.

To improve public safety, public agencies will have opened the traffic management systems and the public right-of-way for the installation of electronic enforcement systems, with the main emphasis on reducing incidents. If, for example, the system detects that a red light violation is about to occur, the traffic signal timings are instantly adjusted to avoid a collision.

Drivers of passenger vehicles can travel their route confident that the large commercial vehicles in their midst are driving safely. The commercial vehicles have the same vehicle and driver monitoring systems. In addition, electronic roadside inspection points check the condition of all commercial vehicles on major road facilities. They perform weigh-in-motion, and receive an electronic report from the commercial vehicle's operating system on the status of key systems.

A greater emphasis is placed on safety and security, and systems that enhance vehicle safety and traveller security. Vehicle safety systems are used to sense all potential dangers. If a vehicle system is on the verge of failure, the driver is warned immediately. Tools are provided to assist drivers in navigating their route. Further, if the driver has placed the vehicle in a potentially dangerous situation, the vehicle safety systems recognize the danger and take the necessary corrective action in a fast and efficient manner. The transit vehicles will be equipped with vehicle and driver monitoring systems. In addition, transit passengers have their own personal safety devices if they feel threatened as pedestrians, or while using the transit systems.

Time spent travelling between places of business will no longer be considered to be wasted time. To begin with, personalized traveller information services will provide information on the best route, and the estimated travel time. These services will be possible through the complete availability of traffic data. Travellers will be able to communicate with their places of business, make hotel reservations, and receive personalized news reports. For example, travellers will have advance information regarding routes, schedules, space availability, and reservations for the ferry services.



Tourists will be able to access information on the transportation network, and advertisements for tourist attractions.

ITS will provide enhanced tracking and real-time management of containers and other goods at intermodal terminals. This will increase the security and efficiency of the intermodal terminals in Halifax, Saint John, and Moncton.

The public transit systems will be managed using sophisticated vehicle monitoring systems. They will be connected to the traffic management centres to aid to the prediction of travel times. They will be connected to adjacent transit systems to maintain efficient route connections. Transit riders will be able to determine precisely when the next transit vehicle will arrive through kiosks or portable devices. The improved service helps promote public transit as a viable alternative for commuters and recreational travellers. These types of services will be available in most of the large and mid-sized municipalities in Atlantic Provinces.

Parking management systems provide real-time information to travellers relating to the location of parking lots, and the availability of parking spaces. This is particularly important during the staging of special events.

Providing "intelligent" solutions to transportation problems allows for an investment in the economies of the Atlantic Provinces. The opportunity, provided by the public sector, to access traffic data and the public right-of-way and implement systems creates an environment for the private sector to thrive. Atlantic Provinces-based transportation equipment suppliers will provide the infrastructure for developing Atlantic Provinces systems. Information technology and systems developed in Atlantic Provinces' high technology centres will be adopted by the transportation industry. The exposure gained from successful projects in Atlantic Provinces will help them export their technology to other provinces, and other parts of the world.

The implementation of these sophisticated systems is possible because transportation professionals in the Atlantic Provinces participated in extensive ITS training programs to learn about the technology, implementation strategies, and experience gained in other jurisdictions.

2.2.2 ITS Goals

In order to translate the vision into a strategy, it was important to establish goals, and ultimately, clearly defined objectives. Traditional ITS goals applicable to the Atlantic Region include:

1. Improve safety for the traveling public and commercial vehicles.
2. Minimize delays and congestion in the transportation network to reduce delay costs and boost economic activity and development.
3. Manage travel demand in order to use the transportation network more effectively.
4. Provide fast and coordinated responses to incidents and other emergencies.
5. Improve data collection, management, and sharing to provide users with relevant timely information, and help agencies better manage their operations and infrastructure.
6. Improve interagency coordination and cooperation in order to develop solutions that cross geographic and institutional boundaries.
7. Improve the economic prosperity of a region.

These goals are, in some cases, inter-related and will be achieved through a combination of resources. First, there are the four cornerstones that create a composite of transportation in ITS, namely the travellers, vehicles, wayside and centres. These ITS cornerstones are further described below in Section 2.2.3. Then there are the different roles of participants. The strategies will be implemented through different methods and different processes. The remaining sections provide a series of "views" from each of these perspectives.

2.2.3 Users Views

ITS is an industry that works with both the motor vehicle and the road network. The evolution of the motor vehicle has always been a function of the private sector while the public sector has always been charged with the development of the transportation network, to support the motor vehicle and other modes of transportation. Today, public agencies are predominantly in an "operate, maintain and enhance" role as the rate of transportation network expansion has declined. In many cases, expansion of the road network is being left to the private sector.

We are entering a new phase in the evolution of the vehicle, as we enter the era of the "intelligent" vehicle. The demands resulting from development of the intelligent vehicle create the need for the road right-of-way and the road network to respond through the implementation of ITS.

The broad vision for ITS development in Atlantic Provinces incorporates both the public and private sector roles in ITS as applied to the four cornerstones that create a composite of transportation: travellers, vehicles, wayside and centres. The communications backbone is used to link these components. The ITS cornerstones and the communications backbone form the "physical architecture" to which the ITS vision is applied.

Travellers: "Travellers" include commuters, commercial vehicle operators and tourists. They have an interest in personal mobility, safety, and comfort.

Vehicles: Unless they are on foot, travellers move from location to location using some form of vehicle. "Vehicles" include bicycles, motorcycles, automobiles, trucks, buses, trains, streetcars, and ferries. These types of vehicles serve as private vehicles, public transit vehicles, commercial vehicles, maintenance vehicles, and emergency vehicles.

Wayside: The travellers move on foot or in vehicles from location to location along public rights-of-way. These public rights-of-way consist of roads, rail lines, sidewalks, structures, and traffic control and monitoring devices. Traffic control and monitoring devices are installed and operated in the "wayside".

Centres: Centres play a key role in collecting and disseminating information between travellers, vehicles and the wayside to deliver "intelligent transportation systems". This information is collected and disseminated through a variety of communication devices.

2.2.4 Business View

In developing the ITS strategy, it was important to establish the roles of the stakeholders in the Atlantic Region. These roles are distinctly different, and the role of the stakeholder is dependent on the specific strategy or project. There are four "profiles" to describe the alternative roles. The four "profiles" are:

- Observer;
- Facilitator;
- Participant; and
- Manager.

These alternative roles are described in the following sections:

Observer

In this role, the stakeholder serves solely in a "monitoring" function. ITS progress is dictated by the objectives of the other private sector and/or other public sector agencies.

Facilitator

In this case, ITS progress is led by other private and other public sector objectives. However, the stakeholder has control over some type of "barrier" to the implementation, and has the power to assist in removing the barrier. The private sector or public sector agencies identify barriers to be addressed and the stakeholder responds. The barriers would include: access to data, access to property, access to financial resources, and policies and regulations.

Participant

In this case, the other private sector or other public sector agencies identify their objectives. Where it impacts on the stakeholder's mandate, the stakeholder serves as a facilitator. However, in this scenario, the stakeholder also actively participates in the project, since it provides a significant benefit to the stakeholder.

Manager

Under this scenario, the stakeholder's mandate is directly affected by ITS progress. In this case, the stakeholder identifies all the objectives, and chooses the projects, partners, and funding mechanisms.

It should be noted that the four roles are not mutually exclusive, and that the progression from Observer through to Manager reflects an expanding role.

2.2.5 Procurement View

The first step in the procurement view was to establish who will be the primary and secondary beneficiaries of an ITS application. Exhibit 2.3 provides a perspective. It is logical to assume that the agency absorbing the "costs" would be responsible for procuring the application.

Exhibit 2.3 – ITS Applications – Typical Beneficiaries

ITS Application	Beneficiary		Costs
	Primary	Secondary	
Advance Traffic Management Systems	Public Individuals Private Sector Agencies	Public Sector Agencies	Public Sector Agencies
Advanced Traveller Information System	Public Individuals Private Sector Agencies		Public Individuals Private Sector Agencies
Electronic Toll Collection	Private Sector Agencies Public Individuals	Public Sector Agencies	Private Sector Agencies Public Individuals
Commercial Vehicle Operations	Private Sector Agencies	Public Individuals Public Sector Agencies	Private Sector Agencies
Advanced Public Transport Services	Public Individuals Public Sector Agencies		Public Sector Agencies

There are a variety of procurement strategies to be assessed. They include public agency procurement, public-private partnership, and public-public partnership. Exhibit 2.4 includes examples of the different procurement processes for applications at the national, regional, and local levels.

Exhibit 2.4 – Examples of Procurement Processes

Type of Partnership	National	Regional	Local
Public-Private Partnership	E-Commerce in the Canadian Trucking Industry	RWIS for Snow Plows in Southern Ontario	EDIport
Public-Public Partnership	Canadian Multi-Application Smartcard Initiative	Centre-to-Centre ITS for Toronto	AVL for Transit Vehicles, St. John's
	Canadian National ITS Architecture	ITS Strategic Plan for Atlantic Canada	

2.2.6 Process View

The vision sets the stage for the strategy development. Goals will be set, and a series of specific objectives will be identified. The Strategic Plan will then progress to develop strategies and specific projects. Roles will be defined for the stakeholders, and an implementation plan will be developed and executed.

Notwithstanding, a strategic plan cannot be a static document. Many of the strategies and projects will take years to execute. In the meantime, new User Services will be identified, and new technologies will be developed. The plan will need to evolve and change to reflect these developments.

The cornerstone of the Strategic Plan is a straightforward process that flows logically from goals and objectives, through the identification of strategies and roles, and then to implementation plans. If the Strategic Plan process is easy to follow, then it will be easy to incorporate a new User Service, or a new technology, into the plan. Conversely, a user will be able to determine that a new development does not fall within the ITS Strategic Plan.

When a new technology or potential User Service is identified, it will first be assessed to determine if it contributes to the ITS goals. The next step will be to determine if it can directly contribute to meeting a specific objective. If the new development "passes" these tests, then it can be integrated into the Strategic Plan.

2.3 USER SERVICE ASSESSMENT

With the transportation needs that characterize Atlantic Canada identified and an "ITS Vision" developed to help shape the Strategic Plan, the next step was to map the user needs to the User Services that can best service Atlantic Canada. The starting point for this process was the master list of ITS User Services. These services were reviewed and discussed with the stakeholder community in the Atlantic Region in order to develop a shortlist of the most applicable User Services. In doing so, stakeholders considered whether a given User Service addresses their needs. Stakeholders and the project team considered what functions are characteristic of a given need, and in turn how a given User Service improves upon that functionality.

The following sections provide an overview of the User Service "toolbox", the identification of the high priority User Services, with those User Services mapped to the needs identified in Section 2.1. Each User Service has been subjected to a detailed analysis to assess the ability to meet the stated needs and the practicality for implementation. As part of this exercise, some candidate "early winner" projects have been identified in association with some of the User Services.

2.3.1 User Service 'Tools'

It is useful to compare the selection of ITS applications to the process of selecting 'tools' from a 'toolbox'. The 'toolbox' can be taken to be the *Canadian Architecture for Intelligent Transportation Systems*. The 'tools' are the User Services and User Sub-Services that are identified to define the Architecture. These tools can be used independently or in combination to address the transportation needs of Atlantic Canada.

The User Services of the Canadian ITS Architecture are organized into 8 User Service bundles. Within these bundles, there are 35 User Services and 90 User Sub-Services included in the toolbox. A complete definition of each User Service and associated sub-services is available on the Architecture CD, or at www.its-sti.gc.ca.

2.3.2 Identification of Higher Priority User Services

In consideration of the input from the Needs Assessment, the ITS Vision, and the four User Service focus groups, the following User Services were identified as having the higher priority within the Atlantic Region:

1.1	Traveller Information
1.4	Traveller Services and Reservation
2.1	Traffic Control
2.2	Incident Management
2.4	Environmental Conditions Monitoring
2.5	Operations and Maintenance
2.6	Automated Warning and Enforcement
3.1	Public Transport Management

4.1	Toll Roads, Parking and Transit
5.1	Commercial Vehicle Electronic Clearance
5.5	Intermodal Freight Management
5.6	Commercial Fleet Management
6.1	Emergency Notification and Personal Safety
6.3	Disaster Response Management
6.4	Emergency Vehicle Management
8.1	Weather and Environmental Data Management.

Definitions for the 16 User Services are presented in Appendix R and focus on key themes most relevant to the Atlantic Region, namely goods movement, rural incident response, road weather information, and seamless accessible surface transportation for travellers on a region-wide scale. It is important to recognize that within these User Services there may be some sub-services that are not as relevant as others, and this will be assessed under Section 4.3 of the project. Similarly, this listing is not intended to be exclusive, and sub-services from other User Service areas could emerge as being relevant over time. While any of these User Services can exist independently, there are several logical synergies among the shortlist. For example, Environmental Conditions Monitoring directly relates to Weather and Environmental Data Management, which in turn supports a range of other services such as Traveller Information, and Commercial Fleet Management.

2.3.3 Mapping the User Services to Needs

The following summary table (Exhibit 2.5) maps the identified needs against the User Services and sub-services. Essentially, the table is a visual summary indicating the User Services that have the potential to address the identified needs and would be most useful as elements of an ITS strategy.

Exhibit 2.5 – Mapping User Services to Needs

IDENTIFIED NEED ➔	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RELEVANT USER SERVICES AND SUB-SERVICES 🡇	Expedited border crossing inspection and clearance for commercial vehicles	Reduce rural road collisions through early detection of adverse conditions	Reduce the incidence, severity, and cost to the community of road collisions	Improved safety at work zones on roadways (smart work zones)	Improved effectiveness and efficiency of roadway winter maintenance operations	Expedited weight, credential, and safety checks for commercial vehicles	Road emergency notification and information system for rural areas	Improved ferry services	Provide travel incentives and traveller information to promote tourism	Enhanced safety and security for travellers and for transportation operators and facilities	Enhanced ability to detect, verify, and respond to incidents on major roadways	Enhanced tracking and real-time mgmt of containers & other goods at intermodal terminals	Real-time transit service monitoring and public information	Improved management of fleet transportation services	Real-time management of parking operations
1.1 TRAVELLER INFORMATION															
1.1.1 Broadcast Traveller Information	✓	✓	✓	✓				✓	✓				✓		✓
1.1.2 Interactive Traveller Information	✓	✓						✓	✓				✓		
1.4 TRAVELLER SERVICES AND RESERVATIONS															
1.4.2 Services Purchases and Reservations	✓							✓	✓						
1.4.4 Regional Parking Management									✓	✓					✓
2.1 TRAFFIC CONTROL															
2.1.1 Network Flow Monitoring			✓	✓				✓							
2.1.2 Surface Street Control	✓	✓	✓				✓	✓							
2.1.5 Traffic Information Dissemination			✓							✓	✓				
2.2 INCIDENT MANAGEMENT															
2.2.1 Incident Management Coordination		✓	✓	✓							✓				
2.4 ENVIRONMENTAL CONDITIONS MANAGEMENT															
2.4.1 Roadway Environmental Sensing		✓	✓		✓										
2.4.3 Road Weather Information System		✓			✓										
2.4.4 Vehicle-based Sensing					✓										
2.5 OPERATIONS AND MAINTENANCE															
2.5.1 Infrastructure Maintenance Management		✓			✓										
2.5.2 Smart Work Zones		✓	✓	✓						✓					
2.6 AUTOMATED DYNAMIC WARNING AND ENFORCEMENT															
2.6.1 Dynamic Roadway Warning		✓	✓	✓						✓					

Exhibit 2.5 – Mapping User Services to Needs

IDENTIFIED NEED ➔ **RELEVANT USER SERVICES AND SUB-SERVICES** 🡇	1 Expedited border crossing inspection and clearance for commercial vehicles	2 Reduce rural road collisions through early detection of adverse conditions	3 Reduce the incidence, severity, and cost to the community of road collisions	4 Improved safety at work zones on roadways (smart work zones)	5 Improved effectiveness and efficiency of roadway winter maintenance operations	6 Expedited weight, credential, and safety checks for commercial vehicles	7 Road emergency notification and information system for rural areas	8 Improved ferry services	9 Provide travel incentives and traveller information to promote tourism	10 Enhanced safety and security for travellers and for transportation operators and facilities	11 Enhanced ability to detect, verify, and respond to incidents on major roadways	12 Enhanced tracking and real-time mgmt of containers & other goods at intermodal terminals	13 Real-time transit service monitoring and public information	14 Improved management of fleet transportation services	15 Real-time management of parking operations
3.1 PUBLIC TRANSPORT MANAGEMENT															
3.1.1 Transit Vehicle Tracking										✓			✓	✓	
3.1.2 Transit Fixed-route Operations													✓	✓	
3.1.3 Passenger and Fare Management													✓	✓	
4.1 ELECTRONIC PAYMENT SERVICES															
4.1.1 Electronic Toll Collection								✓						✓	
4.1.2 Electronic Parking Payment								✓							✓
4.1.3 Transit Services Payment													✓		
4.1.4 Traveller Services Payment								✓	✓						
5.1 COMMERCIAL VEHICLE ELECTRONIC CLEARANCE															
5.1.1 Electronic Clearance	✓					✓		✓				✓		✓	
5.1.2 International Border Crossing Clearance	✓					✓						✓		✓	
5.1.3 Weigh-in-Motion (WIM)	✓					✓						✓		✓	
5.5 INTERMODAL FREIGHT MANAGEMENT															
5.5.1 Freight In-Transit Monitoring						✓						✓		✓	
5.5.2 Intermodal Interface Management						✓						✓		✓	
5.6 COMMERCIAL FLEET MANAGEMENT															
5.6.1 Fleet Administration	✓												✓	✓	
5.6.2 Freight Administration	✓												✓	✓	
6.1 EMERGENCY NOTIFICATION AND PERSONAL SECURITY															
6.1.1 Personal Security		✓					✓			✓	✓				
6.1.2 MAYDAY Support			✓				✓			✓	✓				

Exhibit 2.5 – Mapping User Services to Needs

IDENTIFIED NEED ➔ **RELEVANT USER SERVICES AND SUB-SERVICES ⬇**	1 Expedited border crossing inspection and clearance for commercial vehicles	2 Reduce rural road collisions through early detection of adverse conditions	3 Reduce the incidence, severity, and cost to the community of road collisions	4 Improved safety at work zones on roadways (smart work zones)	5 Improved effectiveness and efficiency of roadway winter maintenance operations	6 Expedited weight, credential, and safety checks for commercial vehicles.	7 Road emergency notification and information system for rural areas.	8 Improved ferry services.	9 Provide travel incentives and traveller information to promote tourism	10 Enhanced safety and security for travellers and for transportation operators and facilities.	11 Enhanced ability to detect, verify, and respond to incidents on major roadways.	12 Enhanced tracking and real-time mgmt of containers & other goods at intermodal terminals.	13 Real-time transit service monitoring and public information.	14 Improved management of fleet transportation services.	15 Real-time management of parking operations.
6.3 DISASTER RESPONSE AND MANAGEMENT															
6.3.1 Disaster Command and Control		✓	✓				✓			✓	✓				
6.3.2 Disaster Information Dissemination		✓	✓				✓			✓	✓				
6.4 EMERGENCY VEHICLE MANAGEMENT															
6.4.1 Emergency Response Management		✓	✓				✓			✓	✓				
6.4.2 Emergency Vehicle Routing			✓				✓			✓	✓				
8.1 WEATHER AND ENVIRONMENTAL DATA MANAGEMENT															
8.1.1 Roadway and Weather Data Fusion	✓	✓	✓		✓										
8.1.2 Environmental Information Dissemination		✓	✓		✓										

2.3.4 User Service Analysis

Each candidate User Service has been analyzed against a set of criteria in consultation with the stakeholder community. The User Service analysis criteria are an aggregation and elaboration of those established in previous ITS Strategic Planning studies in Canada and abroad. A brief description of these criteria is provided as follows:

- **Ability to Address Need** – Does a widely recognized need currently exist and can the facilities/services included in the User Service be deployed to address these priorities?
- **Compatibility with Vision** – Does the User Service correspond with the fundamentals of the Atlantic Provinces ITS Vision as outlined in Section 3.0?
- **Potential Benefit** – Which of the User Services will be of the most benefit in terms of magnitude, payback period, and potential beneficiaries?

- **Practicality** – Can the User Service be ready in the time and are potential users and beneficiaries positioned to make use of the service?

- **Availability of Champion(s)** – Are there individuals, groups or agencies willing to spearhead the planning/implementation to move the initiative along?

- **Risk Management** – Are there risks involved and can they be overcome and managed in the implementation time frame?

- **Capability of Integration** – Can the ITS service be easily integrated into mainstream transportation and management activities within the Atlantic Provinces? Can the User Service be integrated across modes, jurisdictions and geographic areas?

A set of "User Service Assessment" summaries is included in Appendix D for the higher priority/ more relevant User Services. A review of the User Service assessments yields the following observations:

- Most of the User Services are characterized by a high degree of compatibility with the vision and the stated needs, stemming from a readily identifiable and proven set of benefits.

- Most of the User Services under consideration employ proven applications and hence can be considered practical for implementation in the Atlantic Region. However, some User Services, such as Automated Warning and Enforcement are characterized by significant implementation hurdles to overcome, such as legislative changes, and are considered less practical for near term implementation.

- Many of the User Services, such as Traveller Services and Reservations, involve a broad range of stakeholders on a region-wide scale. This presents challenges in terms of identifying appropriate champions to secure funding and lead a deployment and operations effort.

- Virtually all of the User Services under consideration offer some level of capability to integrate and exchange information with other companion User Services. In many cases, enabling standards to support this integration exist or are under development.

2.3.5 Early Winners

One means of examining the merits of a given User Service is to assess the validity of an early winner, or pilot project undertaking. Such undertakings can serve as a microcosm of a broader deployment, and test the abilities to bring together project partners in resolving barriers to implementation, and demonstrate the effectiveness of the application. The User Service focus groups held in each Atlantic Province included an activity where participants were invited to develop strategies, focusing on "early winner" projects that could be implemented fairly quickly and easily, and promote ITS implementation.

The following is a summary of the criteria for which the participants were asked to address for each early winner project:

- **Meets perceived need** – The project meets a perceived need and addresses a higher priority issue;

- **Consensus support** – The initiative has received a level of consensus among stakeholders that it is a worthwhile project to pursue;
- **Minimal technological barriers** – Has a low risk of being held-up or defeated by a technological barrier;
- **Minimal institutional barriers** – Has a low risk of being held-up or defeated by a institutional barrier;
- **Business case** – Can be implemented at a reasonable cost and provide obvious and real benefits to a large stakeholder group;
- **Attracts champions** – Will catch the attention of potential champions among legislators, business leaders, the public and the media; and
- **Contributes to ITS profile/Vital to mainline strategy** – Showcases ITS as a viable component of the mainline transportation strategy.

Exhibit 2.6 is a summary of the potential early winner projects identified by the participants. Appendix E includes summary sheets, which assess each candidate project against the stated criteria.

The identified early winner projects provide a solid starting point for implementation planning, and these projects are carried forward for further analysis under subsequent steps of the project. The candidate early winner projects represent interests expressed by the stakeholders at the user needs focus groups and reflect the various needs for each area.

Exhibit 2.6 – Candidate "Early Winner" Projects

Project Name	Province
Incident Management	New Brunswick
Electronic Payment	New Brunswick
Commercial Vehicle Administrative Process	New Brunswick
Province-wide Weigh-In-Motion Program	Newfoundland and Labrador
Interactive Traveller Information	Newfoundland and Labrador
Red Light Camera Pilot Project	Newfoundland and Labrador
Implementation of Transportation Smart Card	Newfoundland and Labrador
Signal Pre-Emption for Priority Areas	Newfoundland and Labrador
Traffic Responsive Signal System	Newfoundland and Labrador
En-Route Transit Information	Nova Scotia
Public Travel Security	Nova Scotia
Transit Traffic Light Pre-Emption/Priority	Nova Scotia
Consolidation of "Just-in-time" Information Gathering and Dissemination for all Modes of Transportation	Nova Scotia
Initiate Intermodal Network	Nova Scotia
Electronic Payment	Nova Scotia
Centralized Traveller Information System	Nova Scotia
Public Transport Services – Optimize Fleet GPS	Prince Edward Island

Exhibit 2.6 – Candidate "Early Winner" Projects (cont'd)

Project Name	**Province**
Incident Management	Prince Edward Island
Environmental Conditions Monitoring	Prince Edward Island
Adaptive Traffic Signal System	Prince Edward Island
Emergency Vehicle Management	Prince Edward Island
Electronic Payment Services	Prince Edward Island
Demand Responsive Transit	Prince Edward Island
Traveller Information System	Prince Edward Island

2.4 PERFORMANCE CRITERIA

Performance evaluation is an integral component of the deployment of ITS initiatives. The foundation of any performance evaluation is the development of a useful and practical set of performance criteria. These criteria are to be used in the selection process to estimate the extent to which candidate User Services will meet the identified needs and subsequently in the evaluation of the effectiveness of the implemented initiatives.

The performance criteria included both qualitative and quantitative measures, which are generally obtainable and provide an overall measure of success:

- **Transportation Efficiency** – performance measures reflecting a reduction in travel/delivery times, improved reliability of travel time scheduling, a reduction in vehicle delays and the consequential reduction in vehicle emissions;

- **Safety** – A measure of the frequency/severity of collisions and the associated response times should a collision or incident occur;

- **User Satisfaction** – A determination of "customer satisfaction", where the road users are the customers in the system;

- **Reduction in Public Fund Expenditures** – A criteria to determine if the overall benefit of the initiative outweighs the costs of implementation, for the public sector(s); and/or

- **Economic Development** – A measure of the financial effect on the tourism industry.

Exhibit 2.7 includes a summary of the performance criteria for each of the User Services and associated needs. It was intended that the identified performance criteria relevant to a given User Service be carried forward and used to rationalize and assess any given project activities associated with that User Service. Section 5.3.2 presents a more detailed analysis of performance criteria and includes a list of the criteria selected for the recommended deployment projects.

Exhibit 2.7 – Broad Level Performance Criteria For Planning Assessment

USER SERVICES↓	PERFORMANCE CRITERIA→ REFERENCE TO RELATED NEEDS↓	Reduction in Delay	Reduction in Fuel Used	Reduction in Pollutant Emissions	Increase in Schedule Reliability	Reduction in Collisions	Reduction in Response Time	Reduction in Duration of Incident	Level of User Acceptance/Satisfaction	Increase in Tourism-Related Revenue	Reduction in Public Cost	Improvement in Quality of Life
1.1 TRAVELLER INFORMATION	1, 2, 3, 4, 8, 9, 13, 15	●	●	●	●	●			●		●	●
1.4 TRAVELLER SERVICES AND RESERVATIONS	1, 8, 9, 10, 15								●	●		●
2.1 TRAFFIC CONTROL	1, 2, 3, 4, 7, 8, 10, 11	●	●	●		●	●				●	●
2.2 INCIDENT MANAGEMENT	2, 3, 4, 11	●	●	●		●	●	●			●	●
2.4 ENVIRONMENTAL CONDITIONS MANAGEMENT	2, 3, 5	●	●	●	●	●	●				●	●
2.5 OPERATIONS AND MAINTENANCE	2, 3, 4, 5, 10				●	●					●	●
2.6 AUTOMATED DYNAMIC WARNING AND ENFORCEMENT	2, 3, 4, 10					●					●	●
3.1 PUBLIC TRANSPORT MANAGEMENT	10, 13, 14				●				●		●	●
4.1 ELECTRONIC PAYMENT SERVICES	8, 9, 13, 14, 15	●	●	●	●				●	●	●	●
5.1 COMMERCIAL VEHICLE ELECTRONIC CLEARANCE	1, 6, 8, 12, 14	●	●	●	●	●					●	●
5.5 INTERMODAL FREIGHT MANAGEMENT	6, 12, 14	●	●	●	●						●	●
5.6 COMMERCIAL FLEET MANAGEMENT	1, 13, 14	●	●	●	●						●	●
6.1 EMERGENCY NOTIFICATION AND PERSONAL SECURITY	2, 3, 7, 10, 11						●				●	●
6.3 DISASTER RESPONSE AND MANAGEMENT	2, 3, 7, 10, 11						●				●	●
6.4 EMERGENCY VEHICLE MANAGEMENT	2, 3, 7, 10, 11						●				●	●
8.1 WEATHER AND ENVIRONMENTAL DATA MANAGEMENT	1, 2, 3, 5	●	●	●	●	●	●				●	●

3. OPPORTUNITIES ANALYSIS

The Opportunities Analysis is intended to provide the basis for further ITS planning and design initiatives in Atlantic Canada and is also intended to guide investment decisions on ITS activities. Analysis included the development of an Operations Plan to identify ITS deployment, operations, and maintenance, and an identification of stakeholder roles to successfully apply the plan.

The types of opportunities that were deemed most applicable in the Atlantic Region, and that warrant development and sponsorship include:

- Improving the accessibility and efficiency of transportation through better integration of services and traveller information, and driver aids that include remote driver assistance using wireless communications;
- Making more efficient use of existing transportation infrastructure through providing timely incident management, congestion management and navigational aids;
- Reducing time and travel costs for individuals but more importantly, vehicle fleets, can make a difference in productivity; and
- Reducing the number and severity of vehicle collisions through in-vehicle and wayside means. Emergency services will also be made aware of incidents earlier which will reduce delays in getting help.

3.1 OPPORTUNITIES ANALYSIS WORKSHOP

On January 31, 2002 a full day workshop was held in Moncton to include all interested stakeholders. The workshop was attended by 65 people, including representation from the project team and a strong cross-section of stakeholder groups, drawing primarily from the focus group attendees. The session included:

- An overview of the study efforts to date including the results from the focus groups;
- Breakout groups to provide a detailed assessment of the attributes and barriers associated with the higher priority User Services;
- Presentations on past Atlantic ITS projects, and the Transport Canada ITS program;
- Breakout sessions to perform a detailed assessment of candidate early winner projects in each of the key User Service areas; and
- Presentation of the results by the workshop participants.

Appendix F includes a listing of participants, the workshop agenda and a summary report of the event.

3.1.1 Operations Plan

Each of the candidate User Services was subjected to a detailed evaluation in terms of:

- Key beneficiaries;
- Delivery participants;
- Availability of technologies;
- Operations and maintenance considerations; and
- Potential barriers.

The intent of the exercise was to involve the stakeholders in identifying the logical roles for relevant stakeholders in taking ownership in resolving implementation barriers for any given User Service area.

3.1.2 Early Winner Assessment

Participants were asked to perform a detailed analysis of candidate early winner projects in order to force the discussion of roles and responsibilities at a project-specific level. Each project was characterized in terms of the lifecycle development from concept through to implementation and management. The specific candidate projects are listed in the Appendix E summary memo.

The results from the opportunities analysis workshop are presented in the following sections, and provided input to the definition of the ITS program.

3.2 OPERATIONS PLAN AND INSTITUTIONAL ANALYSIS

The ITS Operations Plan and an Institutional Analysis for the Atlantic Region are both closely related and have a bearing on the opportunities to identify projects and associated delivery approaches.

The Operations Plan is a component of the Regional ITS Strategic Plan and incorporates the higher priority User Services that have been identified through the earlier processes of this study.

The ultimate goal of developing the Operations Plan was to identify individual projects that are anticipated to have the best chances for success in the region, based on a number of significant attributes. The Plan deals with aspects relating to the actual means of initiating projects (including an identification of financial means and proponent roles in the delivery), staging of delivery, and ongoing operations and maintenance of system components. It is through the review and analysis of these attributes that decisions are made with regard to the priority of implementing the User Services.

To provide an analytic approach in assessing the User Services and the potential projects that may emerge from them, a compilation of factors or criteria defined as Strategic Plan attributes were considered. These attributes highlight the most pertinent aspects of the User Services as they might be applied in Atlantic Canada, and are defined in the subsequent sections.

3.2.1 Strategic Plan Attributes

There are four pertinent aspects or attributes of the Strategic Plan that must be analyzed in order to make decisions regarding the initiation of projects and the stakeholders that should be involved in the implementation. The critical Strategic Plan attributes are:

- Key Beneficiaries;
- Delivery Participants;
- Availability of Technologies; and
- Operations and Maintenance Considerations of Services Provided.

The institutional analysis attributes are included under:

- Known Barriers to Implementation by Delivery Participants.

The following sub-sections describe the attributes in detail as they have been considered in the Opportunities Analysis.

Key Beneficiaries

There are several ways to categorize key beneficiaries. The approach selected for use in this application includes all potential beneficiaries of ITS implementation in eight categories. The first five, covering the stakeholder categories identified in Section 1.2, are:

- Owners/Operators/Regulators;
- Suppliers;
- Customers and Service Providers;
- Researchers; and
- Special Interest Groups.

The following additional definitions were added to supplement the above:

- **Travellers** – Perhaps the most important beneficiaries are travellers. These individuals look to roads agencies and service providers for up-to-date information regarding the availability and schedule of those transportation facilities and services that they are either intending to use shortly or immediately. This group requires access to information in a readily available format, in the vehicle, in the home or business. In addition, in cases where travellers require response, they rely on those same agencies and operators for quick and efficient response to reduce the extent of any emergency situation.

- **Enforcement Authorities** – The ability of enforcement authorities to provide security and safety in the context of transportation facilities is enhanced with ITS. Whether their jurisdiction involves Traffic Act infractions, import/export regulations, immigration/emigration policy adherence or ferry restrictions, ITS can provide them with an improved means of providing inspections, monitoring and surveillance in an efficient manner.

- **Emergency Service Providers** – In the event of emergencies, whether they are road-related or not, emergency providers rely on roads to access the site of the emergency. In the event of a non-road related emergency, emergency service providers can use electronic real time information to identify the most appropriate route to the emergency, based on congestion reporting or other road conditions reports. For road related emergencies, ITS can offer surveillance opportunities to assist emergency staff to assess the situation prior to responding.

Delivery Participants

ITS services are traditionally implemented by major public and private organizations. For the purposes of this application, the following participant groups were identified for consideration:

- **Federal Government** – The Federal Government has a role through financing and/or operation of the Trans-Canada Highway, the national highway system, the ports, airports and other transportation infrastructure. On the basis of their roles in these contexts, federal agencies and in particular Transport Canada, have a responsibility to enhance those areas of the transportation network that are within their jurisdiction.

- **Provincial Government** – The Provincial Government also has a major role in defining, funding and operating emergency services, including police and ambulance. The Departments of Transportation from the four provinces operate highway networks.

- **Municipal Government** – The municipalities operate road networks, traffic control systems, transit systems, parking and emergency services.

- **Non Profit/Advisory** – The non-profit sector needs to participate in developing appropriate institutional and technical support for the final ITS deployment plan for the region. Environmental groups can be important stakeholders in transportation, and play key roles in advocating transit-friendly, multi-modal transportation policies and programs. Professional bodies play a key role in information transfer, standards setting, education and training.

- **Private Sector** – They are identified as "customers" since they in most cases directly receive an ITS service for commercial purposes. In some cases, they are in the business of "information service provider" or value-added service provider, by repackaging ITS information and distributing it to the ultimate end user.

Availability of Technologies

Technologies that are potentially applicable in the Atlantic Region range from electronics and communications instrumentation in vehicles, to control centres, to consumer households, and to field instruments. For the purposes of this application, five groups of technologies were considered and these are described below. The five groups are defined in terms of the two-way communications that are established between entities. This includes the communications itself but also the terminal equipment (i.e. sensors) involved with the entire communications process. The links are described in detail in the ITS Architecture for Canada.

The technology groups are:

- **Centre to Wayside** – These components provide communications between operations centres and electronic equipment that are in the transportation networks of Atlantic Canada, primarily along the roads of the region but also at international border crossings and at terminals. These may include:
  - Data collection and monitoring devices;
  - Dynamic message signs;
  - Environmental monitoring devices;
  - Ramp metering;
  - Traffic signals;
  - Vehicle sensors; and
  - Video monitoring.
- **Centre-to-Centre** – As data is transmitted from an operator to another information user, it is considered to be centre-to-centre communications. Types of ITS operations that require this transmission type are:
  - Data archival;
  - Incident management;
  - Rail coordination;
  - Traffic management;
  - Transit management; and
  - Traveller information.
- **Centre to Vehicle/Traveller** – In the situations where information is conveyed directly between an ITS operations centre and a traveller, whether enroute or prior to travel, it is considered to be centre to vehicle / traveller. Examples of these communications are:
  - Mayday;
  - Transit vehicle communications; and
  - Traveller information.
- **Wayside to Vehicle** – Information is transmitted from the field equipment to a vehicle. This is considered to be wayside to vehicle communications. Examples of this type of interface include:
  - Electronic toll/fee collection; and
  - Signal priority.
- **Wayside to Wayside** – In specific situations, information is communicated between wayside environments. Examples of this is are Highway Rail Intersection (HRI) and "smart signs".

Operations and Maintenance Considerations of Services Provided

As with any service that is implemented for transportation purposes, once it has been installed and operational, it must be operated and maintained on an ongoing basis. This role may involve individual focus on a full time basis, or intermittent observation of its operational status over the course of a long time period. In all cases with ITS equipment, operations and maintenance is required and must be considered in the matrix to identify ITS projects for pursuit. Consideration of skills that are inherent with the operations and maintenance must be brought into the assessment of whether an ITS technology can be readily introduced into any particular application in Atlantic Canada.

3.2.2 Institutional Analysis

As noted above, some of the key considerations in implementing ITS User Services are the potential barriers to that implementation. The barriers of a User Service, also described as issues that may slow or eliminate the potential for application, must therefore be identified early on so as to also identify any potential actions that could be triggered to overcome those barriers. The barriers presented in this section of the report are pertinent in Atlantic Canada; however, in order to develop a feasible and sufficiently detailed Operations Plan, local input was required to identify the specific barriers, and the specific potential solutions to overcome the barriers.

Known Barriers to Implementation by Delivery Participants

Decades of experience have led to a stable operating structure for government agencies responsible for building, maintaining, and operating transportation facilities. Each agency is responsible for specific roads and/or transit services. The responsible agencies are traditionally well versed in their respective tasks. Funding mechanisms are in place, experienced staff carry out projects, and long-term plans guide decision-making. To some extent each agency is capable of operating independently of other government departments responsible for transportation. This "stability" can sometimes represent a barrier in terms of a lack of flexibility to introduce innovative programs.

Conversely, a number of government agencies have experienced radical change over the past few years. Jurisdictions have been amalgamated, the roles of the agencies have been redefined, organizations have been restructured and down-sized, and the financial processes have changed. In these cases, the barrier can be "instability".

Deployment of ITS is a significant departure from "business as usual" for transportation agencies. Projects cut across all types of transportation facilities and raise a whole host of new implementation questions. Balancing ITS and "traditional" transportation investments becomes a challenge, as does finding the right personnel for the job. In fact, the multitude of "institutional issues" related to ITS planning and deployment are so significant that they often overshadow the technological challenges of a given project.

At their core, many ITS issues simply boil down to a lack of experience. In time, agencies will adapt to the needs associated with ITS, just as they adapted to major highway building programs, new transit systems, and other major developments. Now that transportation agencies throughout Canada (and the US) have close to 10 years of experience with widespread ITS deployment, many of the challenges and most promising solutions are becoming more apparent.

There are five groups of barriers that are anticipated to have a bearing on the success of implementing the Operations Plan. The groups are:

- Organizational Issues;
- Project Finance;
- Legal;
- User Acceptance; and
- Technical.

Each of these groups of barriers is described below:

- **Organizational Issues**

Inter-Agency Coordination

One of the most widely documented institutional issues is interagency coordination and communication. Many ITS projects, such as traffic management, rely on data from a number of transportation agencies. Projects must be designed with the needs of a wide array of users (travellers) and operating agencies in mind. In many cases, however, these agencies are not accustomed to working together closely and on a consistent basis. A primary example is coordination between provincial and municipal traffic engineering staff. Establishing interagency coordination and mechanisms for communications is both a serious challenge and crucial to project success.

Intra-Agency Coordination

Intra-agency coordination can also be a significant issue, especially in larger organizations. For example, it is not clear who would take responsibility for new and emerging roles/services such as commercial vehicle operations programs. For an example at the municipal level, the department of a municipality responsible for traffic signals might not interact very often, or very successfully, with the department responsible for transit operations.

Partnerships

Over the past several years there has been an increasing emphasis on the establishment of partnerships to enable various transportation industry stakeholders to jointly pursue common interests and objectives. Public-public partnerships can be used as a means of facilitating inter-agency co-operation. However, public sector agencies have traditionally been constrained in their ability to enter into partnerships.

Changing Skill Sets

Most transportation agencies have hired technical expertise to deal with traditional transportation tasks like road building and maintenance, transit operations, etc. Few agencies, however, have expertise in software design and procuring high-tech equipment. Also, the availability of information technology resources in the current market is an issue. ITS deployment necessitates that transportation agencies quickly acquire a broad set of high-technology skills, and that transportation planners focus more on the needs of day-to-day operations rather than just capital improvement projects. The ongoing operations and maintenance of ITS application requires specialized in house and/or contracted resources including:

- specialists in traffic operations, with training in areas such as traffic engineering and traffic operations, coupled with competency in information systems.
- maintenance technicians qualified in the areas of field electronics, communications equipment, and information technology.

Customer Focus

Transportation agencies are under increasing pressure to accommodate the transportation needs of their communities with a new customer focus. There is increasing pressure to shift attitudes among transport authorities away from simply maintaining infrastructure, to managing the provision of transport services. Contributing to the customer focus is the realization that transportation agencies will not be able to build their way out of transportation problems such as congestion, and mitigating those problems often involves promoting a less "popular" means of travel. For these reasons, transportation agencies need to understand their customers and the acceptable solutions to transportation problems in their community.

- **Project Finance**

Capital and Ongoing Funding

All government agencies are facing constrained budgets, and each year the challenge of providing the same level of service becomes more and more difficult. In the conventional transportation funding model, ITS could represent an additional burden for government agencies. The very nature of ITS makes it necessary for agencies to change the way they see their "customers" also opens the door to new means of financing projects. In some cases government agencies know little about the financing opportunities that exist and are unaware of how to proceed with an innovative project finance plan. As an example opportunity, the Transport Canada ITS Partnerships Initiative provides funding as part of the ITS Plan for Canada. Other funding opportunities are identified in Section 6.3.4.

- **Legal**

Liability

A significant risk to both government agencies and commercial vendors is legal liability. Any new technology or process raises questions pertaining to how the user can expect to be protected and who is at fault if the system does not perform as expected. If a truck operator cannot get their permits and inspections processed because a computer system crashes, the trucker is at risk of losing revenue and customers and may seek to hold the government agency operator responsible.

Privacy

Another barrier to widespread adoption of certain technologies is privacy. Travellers may be concerned that traffic monitoring efforts may eventually lead to "Big Brother" tracking an individual's daily movements. The legal identification of vehicles through electronic license plates has long since been contemplated for a number of ITS applications but privacy concerns have posed a significant barrier. Commercial vehicle operators may be concerned that electronic access to data pertaining to permits, inspection records, etc., may lead to certain carriers being targeted for increased scrutiny by regulatory officials.

Intellectual Property

Many ITS projects involve a commercial vendor developing a customized computer and/or telecommunications package for a government agency. In some cases this project may be a public-private partnership, while in others it may be a conventional customer-vendor arrangement. The development of technologies and processes raises intellectual property issues. Vendors are accustomed to retaining the rights to whatever they develop, while a government agency may (often by law) expect to retain the rights to anything developed using taxpayer funding. While some governments have faced these issues before, typically transportation agencies have little experience in this area. Furthermore, the rapidly evolving communications and information technology industries make the issue far more complicated.

Procurement Practices

Public sector departments active in the ITS arena are typically limited in their flexibility with respect to procurement policies and mechanisms. In the interest of equitability, agencies are typically restricted to public tender and RFQ/RFP processes for procurement. For transport authorities, these processes are typically oriented towards hard engineering for infrastructure development and may not provide the flexibility for innovative multi-agency ITS applications. Agencies dealing with ITS need some degrees of flexibility and autonomy to pursue these innovative solutions while still maintaining and demonstrating open and fair procurement practices.

Policy and Legislation

Current government policy at all levels is unlikely to be broad enough to accommodate the intents and methods that ITS will require as it becomes sought for wider application in Atlantic Canada. Aspects that include public-private partnerships, guidelines and best practices to encourage use of ITS, intellectual property, privacy and the Traffic Acts of each province must be addressed in order that the application of new technologies can be implemented and within acceptable boundaries of use.

- **User Acceptance**

Technology Adaptation

The ability of the public to accept new technology applications and integrate these applications into their daily routines is a critical consideration for ITS deployment.

Public Perceptions

The public's perception of how a technology is being applied will influence the rate of acceptance. As information flows within the transportation sector become more automated, there is increasing public concern over the transfer of information.

- **Technical**

  Standards and Architecture

  ITS architecture and standards are crucial to ensuring that whatever technologies are deployed deliver the maximum benefits to the traveling public and government agencies. Many jurisdictions may already have components of incompatible systems in place and will be reluctant to agree to a standard that requires them to replace their existing equipment. Similarly, private sector vendors will lobby aggressively for those specifications that are closest to their existing products and capabilities.

  Availability or Infiltration of Field Equipment

  In addition to the compatibility aspects of ITS implementation, it is very important to stage ITS implementation to utilize technologies as they become available to the region. It may be suggested that a particular technology is expected to improve efficiencies significantly, once available. An example, although not necessary for Atlantic Region, is the infrared camera surveillance equipment that potentially can read the number of people in vehicles. This would be useful in High Occupancy Vehicle (HOV) enforcement. It is, however, not available yet as testing is still underway.

Potential Actions to Resolve Barriers

Although the list of potential barriers is long, these are not barriers experienced only in Atlantic Canada, and therefore Atlantic Canada can learn from the experiences elsewhere. Other jurisdictions can provide valuable input to how barriers were identified and then addressed in order to successfully implement an ITS project. Several types of actions are available to overcome barriers that are identified. Examples of these actions, as they have been applied elsewhere, are provided for consideration in addressing those that may arise in Atlantic Canada.

- **Financial Grants**

  Establish grant programs to provide seed money for ITS. Government agencies may be reluctant to commit their own funds at first. Seed money can be very effective in expediting participation and consensus among a coalition of agencies.

- **Improved Electronic Communications**

  - Improve the communications backbone facilitating the rapid transfer of voice and data: and
  - Use of web-based tools.

- **Changes to Policies / Legislation**
  - Examine legislative requirements to facilitate public-private partnerships;
  - Provide policy framework and department autonomy to facilitate rapid response to public-private partnership opportunities;
  - Establish Task Force to identify/prioritize legal issues that require attention to facilitate ITS. Recommend legislation where necessary;
  - Establish guidelines and best practices to encourage responsible activity by government agencies and/or private vendors. Such documentation reduces the liability risk to both agencies and vendors;
  - Undertake outreach efforts to identify privacy concerns among commercial interest and traveling public;
  - Establish guidelines for dealing with intellectual property concerns in agreements with the private sector; and
  - Provide the flexibility and autonomy to pursue innovative initiatives while maintaining principals of equity and open procurement.
- **Introduction of Standards**
  - Develop Regional Architecture and the application of standards must be a primary objective of the Task Force; and
  - Participate in international standards development initiatives with the ISO and the US program with a view to representing specific Atlantic Canada needs and goals.
- **Improved Skill Sets**
  - Promote professional capacity building programs to introduce existing staff to skills necessary to support ITS;
  - Implement project teams made up of individuals with diverse skills. Facilitate exchanges of staff between different office and/or agencies; and
  - Work with Atlantic Canada universities and community colleges to promote programs that emphasize skills appropriate for ITS. Systems engineering is often a key need.
- **Privatization / Partnerships**
  - Develop organizational framework and hierarchy as a crucial first step toward building consensus and efficient division of tasks;
  - Improve communications amongst groups – establish a variety of means of disseminating information to coordinate activities such as a Task Force and region-wide website;
  - Implement a program of staff exchanges to promote communication between agencies and to make more efficient use of individuals with complementary skills;
  - Consider privatizing some functions. Use the private sector know-how in customer service to promote public sector goals such as increased cost-recovery; and
  - Bring private sector on-board early to encourage interest in ITS and learn what the private sector will expect/need from government agencies.

- **Public Education**
  - Undertake public relations campaign to allay concerns regarding privacy; and
  - Provide public education/awareness regarding system benefits and control of information.

3.2.3 User Services Assessments – Opportunities Analysis

The detailed User Service Assessments were structured to encompass the meanings and intents of Strategic Plan Attributes as described above. The assessments were initially provided by the consultant team. The material was then reviewed, edited and enhanced through a session in the Opportunities Workshop. The input of this "local" knowledge is a key contribution to identifying the regional Operations Plan projects, the specific barriers to overcome, and realistic timeframes for implementation.

The User Service Assessments include a "Rating" for each of the Strategic Plan attributes, followed by a recommended "Timeframe for Implementation".

The ratings consist of three categories:

- "Primary" indicates that the attribute is an important component in developing an implementation plan;

- "Secondary" indicates that the attribute is a significant component in developing the implementation plan; and

- "Not applicable" indicates that the attribute is not pertinent to developing the implementation plan.

Exhibit 3.1 – A Summary Matrix of the Strategic Plan Attributes, provides a broad assessment of the significance of each attribute for the sixteen higher priority User Services. Appendix G contains a series of User Service Assessments that provide greater detail.

The "Timeframe for Implementation" is divided into three timeframes: "Early winner", "Medium term", and "Longer term". The attributes that most affect the estimated timeframe are the "Known Barriers to Implementation by Delivery Participants". User Services with substantial barriers are more likely to require more time to overcome the barriers, and subsequently implement the service.

The sixteen User Services as assessed reflect several trends that are noteworthy:

- In all cases, the owners/operators are key beneficiaries, as are suppliers in many cases, and travellers in most cases;

- Delivery of most User Services includes the Provincial Governments and almost equally, Municipal Governments. The private sector is seen to be involved in most delivery activities;

- Technologies are generally available in Atlantic Canada, particularly Centre to Wayside and Wayside to Vehicle;

- The availability of the necessary skill sets to support ITS technologies in Atlantic Canada is a concern. Acceptable levels of skill sets are identified as being present for only three of the User Services; and

- With regard to barriers, the element most critical to implementing ITS of any type is funding availability. Interagency coordination is a significant issue since ITS requires cooperative effort in many applications. Legal hurdles are also present, particularly where road safety and electronic payment is involved.

Consideration of the barriers, and the means of resolution, is discussed further in Section 3.4.1.

Exhibit 3.1 – Summary Matrix of Strategic Plan Attributes

USER SERVICES STRATEGIC PLAN ATTRIBUTES	1.1 TRAVELLER INFORMATION	1.4 TRAVELLER SERVICES AND RESERVATIONS	2.1 TRAFFIC CONTROL	2.2 INCIDENT MANAGEMENT	2.4 ENVIRONMENTAL CONDITIONS MANAGEMENT	2.5 OPERATIONS AND MAINTENANCE	2.6 AUTOMATED DYNAMIC WARNING AND ENFORCEMENT	3.1 PUBLIC TRANSPORT MANAGEMENT	4.1 ELECTRONIC PAYMENT SERVICES	5.1 COMMERCIAL VEHICLE ELECTRONIC CLEARANCE	5.5 INTERMODAL FREIGHT MANAGEMENT	5.6 COMMERCIAL FLEET MANAGEMENT	6.1 EMERGENCY NOTIFICATION AND PERSONAL SECURITY	6.3 DISASTER RESPONSE AND MANAGEMENT	6.4 EMERGENCY VEHICLE MANAGEMENT	8.1 WEATHER AND ENVIRONMENTAL DATA MANAGEMENT
KEY BENEFICIARIES																
OWNERS/OPERATORS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SUPPLIERS	◐	◐	●	●	◐	●	●	●	○	●	●	●	●	●	◐	◐
CUSTOMERS AND SERVICE PROVIDERS	◐	◐	◐	●	◐	○	○	●	●	○	●	●	●	○	●	○
RESEARCHERS	◐	○	◐	◐	◐	◐	◐	●	○	○	◐	◐	○	○	◐	●
SPECIAL INTEREST GROUPS	◐	○	◐	◐	◐	◐	◐	●	○	○	○	○	○	○	◐	○
TRAVELLERS	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	●
ENFORCEMENT AUTHORITIES	◐	○	●	◐	◐	○	●	●	○	◐	○	◐	○	○	◐	○
EMERGENCY SERVICES PROVIDERS	◐	○	◐	◐	○	○	◐	○	○	○	◐	○	●	●	●	●
DELIVERY PARTICIPANTS																
FEDERAL GOVERNMENT	◐	◐	◐	◐	◐	●	◐	●	●	●	◐	◐	○	◐	◐	●
PROVINCIAL GOVERNMENT	●	●	●	●	●	●	●	●	◐	●	○	◐	●	●	●	●
MUNICIPAL GOVERNMENT	◐	○	●	●	●	●	●	●	●	○	◐	◐	●	●	●	●
NON PROFIT/ADVISORY	◐	○	○	○	○	○	○	◐	◐	○	○	○	○	○	○	○
PRIVATE SECTOR	●	●	●	◐	◐	○	●	●	●	●	●	●	●	○	○	●

● High Significance ◐ Medium Significance ○ Low Significance

USER SERVICES STRATEGIC PLAN ATTRIBUTES	1.1 TRAVELLER INFORMATION	1.4 TRAVELLER SERVICES AND RESERVATIONS	2.1 TRAFFIC CONTROL	2.2 INCIDENT MANAGEMENT	2.4 ENVIRONMENTAL CONDITIONS MANAGEMENT	2.5 OPERATIONS AND MAINTENANCE	2.6 AUTOMATED DYNAMIC WARNING AND ENFORCEMENT	3.1 PUBLIC TRANSPORT MANAGEMENT	4.1 ELECTRONIC PAYMENT SERVICES	5.1 COMMERCIAL VEHICLE ELECTRONIC CLEARANCE	5.5 INTERMODAL FREIGHT MANAGEMENT	5.6 COMMERCIAL FLEET MANAGEMENT	6.1 EMERGENCY NOTIFICATION AND PERSONAL SECURITY	6.3 DISASTER RESPONSE AND MANAGEMENT	6.4 EMERGENCY VEHICLE MANAGEMENT	8.1 WEATHER AND ENVIRONMENTAL DATA MANAGEMENT
AVAILABILITY OF TECHNOLOGIES																
CENTRE TO WAYSIDE	●	○	●	●	●	○	○	●	●	●	○	●	○	●	●	●
CENTRE TO CENTRE	●	●	◐	◐	●	○	○	●	○	◐	○	●	○	●	●	●
CENTRE TO VEHICLE/TRAVELLER	●	●	○	◐	◐	○	◐	●	○	○	○	●	●	○	◐	○
WAYSIDE TO VEHICLE	●	○	●	●	◐	◐	●	●	●	●	●	●	○	●	●	○
WAYSIDE TO ROADSIDE	○	○	◐	○	○	○	○	○	○	○	○	○	○	○	○	○
OPERATIONS & MAINTENANCE CONSIDERATION OF SERVICES PROVIDED																
AVAILABLE SKILL SETS	◐	◐	●	◐	◐	◐	○	●	◐	◐	◐	◐	○	○	◐	●
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS																
ORGANIZATIONAL ISSUES Inter-agency coordination Intra-agency coordination Partnerships Changing skill sets Customer focus	●	●	●	●	●	◐	◐	●	●	●	○	◐	○	●	●	●
PROJECT FINANCE	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●

● High Significance ◐ Medium Significance ○ Low Significance

USER SERVICES STRATEGIC PLAN ATTRIBUTES	1.1 TRAVELLER INFORMATION	1.4 TRAVELLER SERVICES AND RESERVATIONS	2.1 TRAFFIC CONTROL	2.2 INCIDENT MANAGEMENT	2.4 ENVIRONMENTAL CONDITIONS MANAGEMENT	2.5 OPERATIONS AND MAINTENANCE	2.6 AUTOMATED DYNAMIC WARNING AND ENFORCEMENT	3.1 PUBLIC TRANSPORT MANAGEMENT	4.1 ELECTRONIC PAYMENT SERVICES	5.1 COMMERCIAL VEHICLE ELECTRONIC CLEARANCE	5.5 INTERMODAL FREIGHT MANAGEMENT	5.6 COMMERCIAL FLEET MANAGEMENT	6.1 EMERGENCY NOTIFICATION AND PERSONAL SECURITY	6.3 DISASTER RESPONSE AND MANAGEMENT	6.4 EMERGENCY VEHICLE MANAGEMENT	8.1 WEATHER AND ENVIRONMENTAL DATA MANAGEMENT
LEGAL Liability Privacy Intellectual Property Procurement Practices Policy/Legislation	◐	◐	●	◐	◐	◐	●	◐	●	◐	◐	○	○	○	○	●
USER ACCEPTANCE Technology Adaptations Public Perceptions	●	●	◐	◐	○	◐	●	●	◐	◐	◐	◐	●	◐	○	○
TECHNICAL Standards and Architecture Availability of Enabling Technologies Availability or Infiltration of Field Equipment	◐	◐	●	◐	◐	●	○	◐	◐	◐	◐	◐	●	○	◐	◐
IMPLEMENTATION STAGING CANDIDATES																
EARLY WINNER (0-5 YRS)	√	√	√	√	√		√	√	√	√	√	√				√
MEDIUM TERM (5-10 YRS)						√							√	√	√	
LONGER TERM (> 10 YRS)																

● High Significance ◐ Medium Significance ○ Low Significance

3.3 PARTNERSHIP OPPORTUNITIES

Partnerships are becoming commonplace in ITS projects and initiatives throughout the world. Specifically, many ITS projects involve one or more of the following characteristics and/or aspects that lend themselves to partnering opportunities:

- Significant upfront and ongoing investment. Likewise, potential for significant benefits and revenue streams;
- Multiple mode impact and geographic coverage;
- Challenging operational transitions;
- Requirement of specialized skill sets;
- Coordination of several agencies and jurisdictions; and
- Multiple beneficiaries in terms of operations and "end users".

3.3.1 Benefits of Partnerships

It is important to examine opportunities for partnering and look to others for examples of their experiences. The U.S. National ITS Program states as one of its eight goals that government should "promote the innovative use of private resources". It also suggests that one of its eight strategies is in creating funding incentives.

As is well known, many of the U.S. ITS programs are funded through traditional transportation funding mechanisms such as the Highway Trust Fund and The Transportation Efficiency Act for the 21st Century (TEA-21). In Canada, this level of government participation is not currently available and it becomes more important to look at partnerships as practical opportunities to introduce ITS into the region.

In the Atlantic Region, ITS partnerships can provide various benefits and opportunities, some of which include the following:

- Improve the product/project provided to the end user;
- Finance projects and sharing funding;
- Improve efficiency of the project;
- Reduce/share risk and/or increase the return on investment;
- Take advantage of the strengths of different organization and increase communications and awareness regarding the project; and
- Complete the planning, design, implementation or operational/maintenance phases of a project.

3.3.2 Types of Partnerships

It became apparent through the Strengths Weaknesses Opportunities and Threats (SWOT) analysis, that there exist a number of opportunities, benefits and motives to form partnerships between various agencies, jurisdictions and private sector entities.

Exhibit 3.2 includes a summary of partnership examples that have been formed to obtain goals of various types of ITS related projects ranging from strategic planning and research projects, to maintenance and operations of facilities. Section 3.3.3 provides a summary of the combined "lessons learned" from a number of these partnerships.

Exhibit 3.2 – Partnership Examples Summary

Project Type	Type of Partnership	Geographic Scope	Related User Services	Examples
Partnerships for ITS Planning and Coordination	Public-Public	Local and Regional	All	ITS Architecture for Canada Atlantic ITS Strategic Plan I-95 Corridor Coalition COATS – California Oregon Advanced Transportation System Statewide Plan for ATIS – Minnesota
ITS Research	Public-Public Public-Private	Local	All	University of Toronto Advanced Transportation Systems Testbed
Joint Use Call Centres	Public-Public Public-Private		2.1 – Traffic Control	City of Toronto and Ministry of Transportation of Ontario – Road information line
Traveller Information Systems	Public-Public Public-Private		1.1 – Traveller Information	Confederation Bridge Highway Advisory Radio Halifax Area Traveller Information Radio TRIP USA Texas DOT and TransGuide TravInfo (et al) – San Francisco Bay Area SmartTraveler – Boston
Fibre for Right-of-Way	Public-Private			Ministry of Transportation of Ontario New York State Thruway Authority
Centre-to-Centre	Public-Public	Local and Regional	2.1 – Traffic Control	Greater Toronto Area Silicon Valley
Toll Roadways	Public-Private	Regional	4.1 – Electronic Payment Services	Dulles Greenway Trip II Highway 407
Traffic Operations Centres	Public-Public	Local and Regional	2.1 – Traffic Control 2.2 – Incident Management 2.3 – Travel Demand Management	Minnesota (Arrowhead Region) - ARTIC City of Toronto Joint Operations Centre
Multi-Modal Operations	Public-Private	Regional		BC CVO
Adaptive Signal Control System	Public-Public	Local	2.1 – Traffic Control 5.0 – Commercial Vehicle Operations	Minneapolis, Minnesota – SCOOT

Exhibit 3.2 – Partnership Examples Summary

Project Type	Type of Partnership	Geographic Scope	Related User Services	Examples
Advanced Road Weather Information System	Public-Public Public-Private	Regional and National	2.4 – Environmental Conditions Management	MRDC – Fredericton-Moncton Highway New Brunswick Department of Transportation Nova Scotia Department of Transportation and Public Works
Emergency Vehicle Management	Public-Public	Local		RESCU – Toronto
Commercial Vehicle Clearance	Public-Private	Regional	5.2 – Commercial Vehicle Electronic Clearance	NORPASS
Border Crossing ITS Plan and Design	Public-Private	Local	4.1 – Electronic Payment Services 5.1 – Commercial Vehicle Electronic Clearance	ITBCS - New York-Ontario International Border Crossing AVION - ITS
Red-light Enforcement	Public-Public Public-Private	Local	2.6 – Automatic Dynamic Warning and Enforcement	Ontario municipalities
AVL/Operations and Maintenance			3.1 – Public Transport Management 2.5 – Operations and Maintenance	Pearson Airport Limousine Management GPS on managing maintenance vehicles
SmartCard Initiatives	Public-Private	Regional	4.1 – Electronic Payment Services 3.1 – Public Transport Management	City of Burlington-GO Transit Barrie Transit VISA Cashcard Guelph Transit Smart Card
Public Transport Management	Public-Private	Regional	3.1 – Public Transport Management 1.1 – Traveller Information	Summit Stage Transfer Centre – Colorado TravLink – Minnesota
Transit Priority	Public-Public	Regional	2.1 – Traffic Control	Toronto Transit Priority Projects for Streetcars
Advanced Parking Information Systems	Public-Public	Local	1.4 – Traveller Services and Reservations 1.1 – Traveller Information	City of St. Paul Boston

3.3.3 Lessons Learned

Some of the main "lessons learned" from ITS partnership activities indicate that partnerships:

- Induce regular meetings and communications between members which assists in the development of a standard approach, and facilitates increased awareness of projects;
- Promote value-added engineering enhancements;
- Address inter-jurisdictional barriers;
- Promote greater adherence to delivery schedule;
- Generate more-hands on involvement by owners and operators;
- Induce co-operation between organizations that generally are viewed as competing entities/companies;
- Facilitate the comprehension of other participants' perspectives;
- Result in the assembly of special skills and management personal; and
- Provide the ability to take advantage of the "economies of scale" through various means ranging from volume purchases of equipment, to sharing on-site construction offices.

The experience of many public sector agencies in pursuing partnerships suggests that significant efforts may be required to adapt procurement practices to accommodate partnership proposals. It is important that this effort be invested at the outset in order to avoid long lead times for individual proposals/projects.

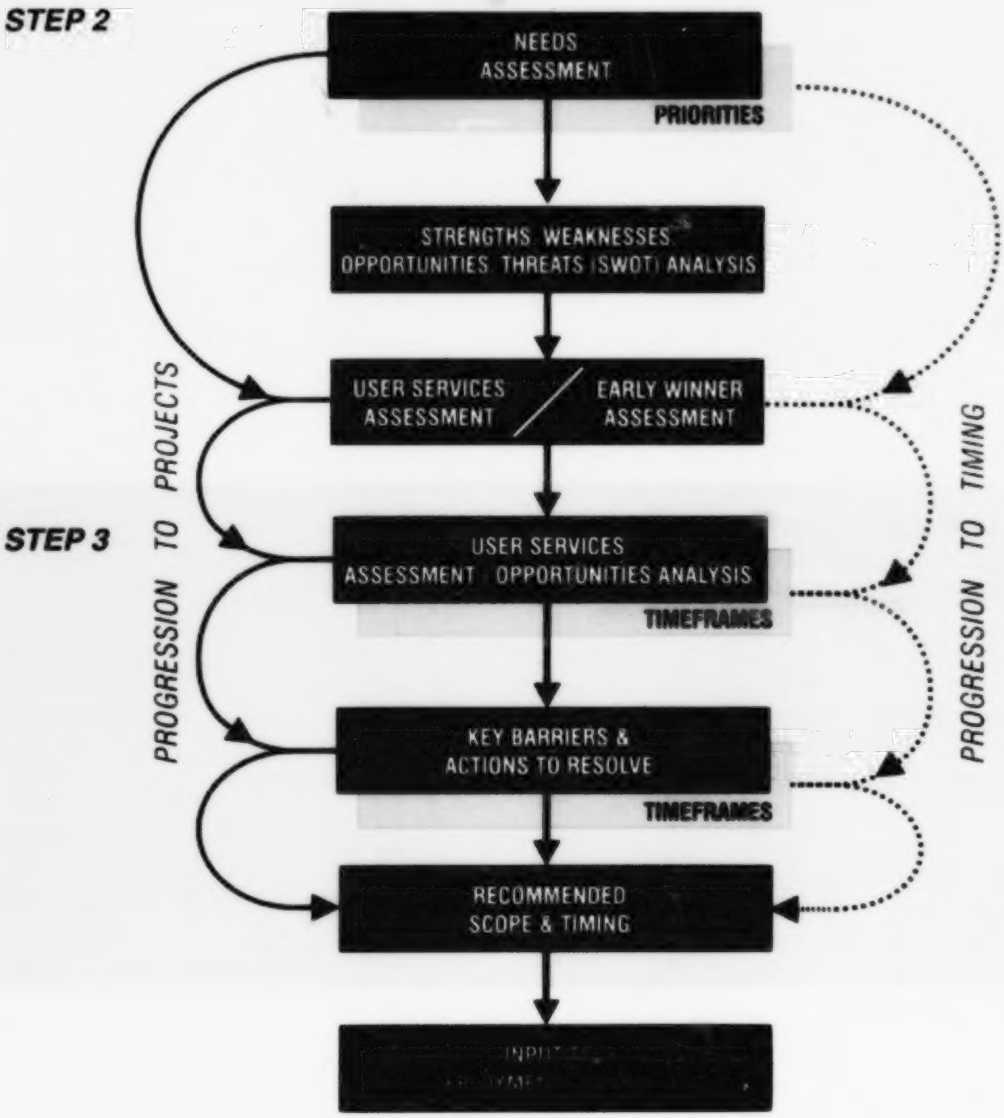
3.4 USER SERVICE REFINEMENT

The development of the Strategic Plan dealt with the needs, a vision, and the assessment and selection of higher priority User Services. The Opportunities Analysis dealt with the beneficiaries, delivery participants, availability of technologies, barriers, and actions to resolve barriers. The above processes are presented in Exhibit 3.3, reflecting the co-ordination and flow between these various steps and analyses. It is clear that ITS projects should be initiated on the basis of need and through application of the most appropriate User Services.

A refinement process was undertaken subsequent to the Operations Analysis to review all of the earlier analytical results, and to ensure consistency within them and that the selection of User Services is most appropriate. Similarly, the timing of implementation should be based on the priorities that have been established for each need and the timeframe assessments that have been completed. This refinement process took into consideration the User Services satisfying needs and the timeframes satisfying Priorities.

The refinement process confirmed that all sixteen User Services that had been identified through the study process were appropriate for implementation in Atlantic Canada and confirmed that the timeframes are consistent with the priorities that are attached to the transportation needs of the region. The potential timeframes also take into consideration the potential barriers and the opportunities to resolve those barriers.

Exhibit 3.3 – Refining the User Services


STEP 2
NEEDS ASSESSMENT
PRIORITIES
STRENGTHS WEAKNESSES OPPORTUNITIES THREATS (SWOT) ANALYSIS
USER SERVICES ASSESSMENT
EARLY WINNER ASSESSMENT
PROGRESSION TO PROJECTS
PROGRESSION TO TIMING
STEP 3
USER SERVICES ASSESSMENT OPPORTUNITIES ANALYSIS
TIMEFRAMES
KEY BARRIERS & ACTIONS TO RESOLVE
TIMEFRAMES
RECOMMENDED SCOPE & TIMING
INPUT

3.4.1 Resolving Barriers

In reviewing the key barriers to implementation, there are a number of common challenges to be addressed. Many of these challenges are not necessarily unique to the Atlantic Provinces, and in fact are shared by many regions in North America. These include:

- Lack of inter-agency co-ordination;
- Lack of start-up funding;
- Competitors must co-operate and co-ordinate to deliver a joint service;
- Protection of intellectual property;
- Requirement for expensive joint back-office to process data;
- Financing to obtain equipment is an issue for smaller commercial operators; and
- Concerns about privacy of employees.

The challenges that are more specific to the Atlantic Provinces include:

- Gaps in wireless service; and
- Large geographic areas, with low-density population may make it difficult to build a business case.

There were a number of actions identified to resolve the barriers. Some of the specific actions that applied to the Atlantic Provinces include:

- Continued regional coordination meetings among the Provinces, under the direction of the Atlantic Council of Premiers, and in coordination with other related forums, such as that for the harmonization of trucking regulations;
- Education of the purchasing agencies within the public sector owner/operators on the nature of the systems procurement process, and the distinguishing features relative to the conventional construction process;
- Pursuit of joint procurement by public agencies within the region in order to employ common equipment specifications, and take advantage of economies of scale;
- Identification and engagement of a champion(s) from the tourism industry associations and Provincial Ministries of Tourism in order to help realize opportunities with traveller information services;

- Continue to represent the four Atlantic Provinces and the related transportation stakeholders as a common voice in dealing with peer agencies such as Transport Canada, and the I-95 Corridor Coalition;

- Identification of lead agencies, or joint ventures among peer agencies in order to take the initiative on multi-party, back office applications, such as that required for data warehousing and potentially electronic payment;

- Advance the development and deployment of various applications, such as that related to border crossings and inter-modal terminals, through the scoping of pilot projects;

- Access opportunities to implement ITS applications related to commercial vehicle operations and border crossings under the Smart Borders Initiative.

Exhibit 3.4 provides a summary of this analysis. The potential actions that arise from Exhibit 3.4 were considered in the deployment program (refer to Section 5).

Exhibit 3.4 – User Service Assessments – Key Actions and Potential Timeframes

USER SERVICE	KEY BARRIERS	ACTIONS TO RESOLVE BARRIERS	POTENTIAL TIMEFRAME
1.1 Traveller Information The Traveller Information User Service provides travellers with information prior to their departure to assist them in making mode choices, travel time estimates, and route decisions. The sub-services of the Traveller Information User Service address four major functions, which are: (1) Available Services Information, (2) Current Situation Information, (3) Trip Planning Service, and (4) User Access. Information is integrated from various transportation modes and other information sources and is presented to the user for decision making.	• Lack of inter-agency co-ordination • Lack of start-up funding • Protection of intellectual property • No central pool for information • Gaps in wireless service	• Identification of a champion, possibly tourism would be appropriate to resolve issues • Start with pilot project in New Brunswick, intercepting travellers from Quebec and from the border crossings, then extend to other provinces • Link to 1.4 Traveller Services/Reservations	■ □ □ 0 - 3 'Early winner' 4 - 7 Medium term 8 - 10 YRS Longer term
1.4 Traveller Services / Reservations The Traveller Services Information User Service provides the traveller with access to "yellow pages" type information regarding a variety of travel-related services and facilities. The information will be accessible to the traveller in the home or office to support pre-trip planning and while enroute, either in the vehicle or at public facilities such as public transit terminals or highway rest stops.	• Competitors must co-operate and co-ordinate to deliver a joint service • Lack of start-up funding • Protection of intellectual property • No central pool for information • Gaps in wireless service	• Identification of a champion, possibly a provincial tourism agency would be appropriate to resolve issues • Start with a pilot project for one province • Link to 1.1 Traveller Information	■ □ □ 0 - 3 'Early winner' 4 - 7 Medium term 8 - 10 YRS Longer term

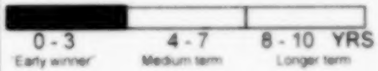
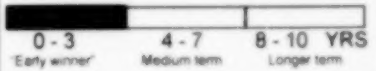
Exhibit 3.4 – User Service Assessments – Key Actions and Potential Timeframes			
USER SERVICE	**KEY BARRIERS**	**ACTIONS TO RESOLVE BARRIERS**	**POTENTIAL TIMEFRAME**
2.1 Traffic Control The Traffic Control User Service manages the movement of traffic on streets and highways. It includes surface street controls such as traffic signal systems, adaptive traffic control systems and freeway control techniques such as ramp metering and lane control. Between the eight sub-services of the Traffic Control User Services, the following four functions are provided which are (1) Traffic Flow Optimization, (2) Traffic Surveillance, (3) Control Function, and (4) Provide Information.	• Equipment and system intensive, and therefore requires substantial funding • Debate over ownership of systems software • Procurement practices treating traffic control systems as a commodity can lead to problems • Pace of development of industry standards	• Educate purchasing agencies on the issues of installing these systems – importance of the best long-term investment, versus the short-term price • Municipalities can consider joint procurements to take advantage of economies of scale	
2.2 Incident Management The Incident Management User Service enhances existing capabilities to identify incidents, formulate response actions, and support initiation and ongoing co-ordination of those response actions. The single sub-service of the Incident Management User Service provides six major functions such as: (1) Scheduled Planned Incidents, (2) Identify Incidents, (3) Formulate Response Actions, (4) Support Co-ordinated Implementation of Response Actions, (5) Support Initialization of Response to Actions, and (6) Predict Hazardous Conditions.	• Lack of mechanisms available for inter-agency co-ordination • Lack of funding • Large geographic areas, with low density population make it difficult to build a business case • Lack of standards, and the issue of interoperability	• Raise awareness of the benefits of incident management • Pilot programs (e.g. Confederation Bridge) • Opportunities to link collision data and images to GIS-T	

Exhibit 3.4 – User Service Assessments – Key Actions and Potential Timeframes

USER SERVICE	KEY BARRIERS	ACTIONS TO RESOLVE BARRIERS	POTENTIAL TIMEFRAME
2.4 Environmental Conditions Management The Environmental Conditions and Monitoring User Service provides government agencies with the capability to enhance their air quality control strategies. The function provides both wide area and Wayside emissions monitoring as well as Road Weather Systems and Services. Information is used by Traffic Demand Management in the Traffic Management Centre to mitigate pollution and may be provided to enforcement agencies to compel offenders to comply with standards. In addition, road weather information and forecasts provide inputs to other systems such as ATMS and ATIS to increase safety and efficiency.	• Lack of mechanisms available for inter-agency co-ordination • Lack of funding	• Build on federal effort to develop a nation-wide Road and Weather Information System network	■ 0 - 3 'Early winner' □ 4 - 7 Medium term □ 8 - 10 YRS Longer term
2.5 Operations and Maintenance The Operations and Maintenance User Service provides government agencies, as well as contractors with the resources to manage the operations and maintenance of vehicle fleet and equipment assets, and monitor and manage traffic flow around work zone areas.	• Introduction of sophisticated technology to operations and maintenance activities • Exposure to liability if systems fail • Can require substantial initial funding	• Implement as part of a greater strategy to form public/private partnerships to deliver operations and maintenance services	□ 0 - 3 'Early winner' ■ 4 - 7 Medium term □ 8 - 10 YRS Longer term

Exhibit 3.4 – User Service Assessments – Key Actions and Potential Timeframes

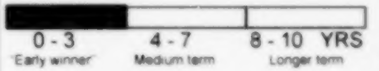
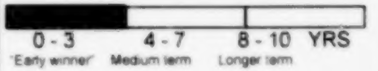
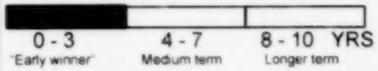
USER SERVICE	KEY BARRIERS	ACTIONS TO RESOLVE BARRIERS	POTENTIAL TIMEFRAME
2.6 Automated Dynamic Warning and Enforcement The Automated Dynamic Warning and Enforcement User Service provides systems which warn vehicles or motorists of imminent danger, and provide electronic enforcement of traffic control and regulations	• Systems are costly to implement, and require a back-office to process fines • Public may perceive electronic enforcement as primarily a revenue generation strategy • Legislation required to implement electronic enforcement • Privacy is an issue when using image recording equipment	• Municipalities can consider joint procurements to take advantage of economies of scale • Ability to offset cost with revenue generation	
3.1 Public Transport Management The Public Transport Management User Service applies advanced vehicle electronic systems to various public transportation modes and uses the data generated by these modes to improve service to the public. It includes operation of vehicles and facilities, planning and scheduling, and personnel management.	• Systems are costly to implement and operate – require a sound business case • May be privacy issues with transit employees	• Market importance of advances to maintain a modern alternative to the car • Financial potential for transit funding through gasoline tax	
4.1 Electronic Payment Services The Electronic Payment Services User Service allows travellers to pay for transportation services by electronic means. Between the four sub-services of the Electronic Payment User Services the following functionality is provided: (1) Electronic Toll Collection, (2) Electronic Fare Collection, (3) Electronic Parking Payment, and (4) Electronic Payment Services Integration. It may, as envisioned, also serve broad non-transportation functions and may be integrated with credit and debit cards in banking and other financial transactions.	• Requires one back office to process transactions • Substantial initial investment, including back office functions • Privacy • Intellectual property • Public required to change payment habits • Standards still evolving	• Government funding for start-up • Form partnerships with one party designated to operate the common back office	

Exhibit 3.4 – User Service Assessments – Key Actions and Potential Timeframes

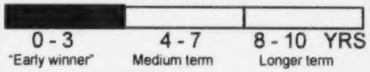
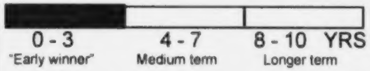
USER SERVICE	KEY BARRIERS	ACTIONS TO RESOLVE BARRIERS	POTENTIAL TIMEFRAME
5.1 Commercial Vehicle Electronic Clearance The Commercial Vehicle Electronic Clearance User Service consists of both domestic and international border electronic clearances. Domestic electronic clearance allows commercial vehicles to continue past inspection stations without stopping. International border clearance allows vehicles to bypass international border checkpoints without stopping, or at least with expedited checks. As a vehicle approaches an inspection station or checkpoint, vehicle to Wayside communications take place that identify the vehicle and make available to authorities the necessary data about credentials, vehicle weight, safety status, cargo, and occupants. Enforcement personnel can then select potentially unsafe vehicles for inspection and allow safe and legal vehicles to bypass the inspection station/checkpoint.	• For international border, requires co-operation and information sharing between U.S. and Canadian agencies • Legislative restrictions on data exchange • Driver/operators may have privacy concerns • Financing to obtain equipment is an issue for smaller commercial operators	• Pilot projects provide opportunity to visit operation/policy issues • Increased interest in security measures might lead to greater support for initiatives	
5.5 Intermodal Freight Management The intermodal freight management User Service provides systems which will monitor the status of freight-in-transit and at freight terminals	• Legislative restrictions on data exchange • Driver/operators may have privacy concerns • Financing to obtain equipment is an issue for smaller commercial operators	• Choose one intermodal terminal for pilot project	

Exhibit 3.4 – User Service Assessments – Key Actions and Potential Timeframes

USER SERVICE	KEY BARRIERS	ACTIONS TO RESOLVE BARRIERS	POTENTIAL TIMEFRAME
5.6 Commercial Fleet Management The Commercial Fleet Management User Service provides real-time communications for vehicle location, dispatching and tracking between commercial vehicle drivers, dispatchers, and intermodal transportation providers, thereby reducing delays for drivers and providing commercial drivers and dispatchers with real-time routing information in response to congestion or incidents. Commercial fleet management includes the management of taxi fleets.	• Financing is an issue for smaller operators • Incomplete wireless communications coverage	• Retain third party to implement.	■ □ □ 0 - 3 "Early winner" 4 - 7 Medium term 8 - 10 YRS Longer term
6.1 Emergency Notification and Personal Security The Emergency Notification And Personal Security User Service provides the capability for the user to manually initiate a distress signal for incidents like mechanical breakdown or non-injury collisions. An automated system would help mitigate the consequences of a serious collision by automatically sending information regarding the location, nature and severity of the collision to an emergency services dispatcher and/or to hospital and emergency room personnel.	• Public willingness to pay for service • Requires installation of equipment in vehicles	• Introduce legislation to make the service mandatory	□ ■ □ 0 - 3 "Early winner" 4 - 7 Medium term 8 - 10 YRS Longer term
6.3 Disaster Response and Management The Disaster Response and Management User Service co-ordinates disaster response strategies from a virtual control centre, and disseminates information to agencies and individuals on traffic conditions, diversion routes etc.	• Information sharing, and control at the scene • Before Sept. 11/01, disasters considered rare, and therefore disaster planning had lower priority	• Educate agencies responsible for disaster response planning – role that ITS can play	□ ■ □ 0 - 3 "Early winner" 4 - 7 Medium term 8 - 10 YRS Longer term

Exhibit 3.4 – User Service Assessments – Key Actions and Potential Timeframes

USER SERVICE	KEY BARRIERS	ACTIONS TO RESOLVE BARRIERS	POTENTIAL TIMEFRAME
6.4 Emergency Vehicle Management The Emergency Vehicle Management Service User Service is oriented towards reducing the time from the receipt of notification of an incident by an emergency services dispatcher, and the arrival of emergency vehicles on the scene. It includes emergency vehicle fleet management, route guidance to the incident scene or a suitable hospital, and pre-emption of traffic signals on an emergency vehicle's route to receive more green displays	• Require extensive field equipment, both on the wayside, and on emergency vehicles • Interoperability of systems	• Promote as a potential strategy to deal with stress on emergency services budgets • Regional meetings	☐ ■ ☐ 0 - 3 "Early winner" · 4 - 7 Medium term · 8 - 10 YRS Longer term
8.1 Weather and Environmental Data Management The Weather and Environmental Data Management User Service provides system wide gathering, fusion, and dissemination of information on roadway weather conditions and forecasts.	• Ownership of data • Coverage in rural areas may be financially difficult to justify given low traffic volumes.	• Start with pilot project involving public/public partnership, or public/private partnership	■ ☐ ☐ 0 - 3 "Early winner" · 4 - 7 Medium term · 8 - 10 YRS Longer term

3.4.2 Recommended Scope and Timing

Through a process of reviewing and refining the User Service Plan and the associated analyses, a comparison was made of the User Services identified for consideration. Exhibit 3.5 summarizes the several stages of analysis. It is on the basis of this overall summary of ratings that decisions were made to recommend timing for deployment of the User Services.

With regard to timeframes, nine Early Winners were identified. The decision to focus on a limited number of Early Winners is strategic from a number of perspectives. Initiating too many projects will dilute the ability of regional stakeholders to focus on the deployment issues that need to be addressed including financing, partnerships, skills and legal aspects. If attention is focused on a few projects then the chances for success increase. The successes of the first few projects will be examined critically by Government and the communities involved. They are therefore most important in the region. For the purposes of diversification, only one project has been selected from each User Service bundle (i.e. Traveller Information Services, Emergency Management Services). The exceptions are in *2.0 Traffic Management Services,* and *5.0 Commercial Vehicle Operations,* where two User Services were selected for early application. This selection of nine User Services overall will blanket the region with a diverse sample of projects.

The User Services identified for Early Winners deployment included:

- 1.1 Traveller Information;
- 2.1 Traffic Control;
- 2.4 Environmental Conditions Management;
- 3.1 Public Transport Management;
- 4.1 Electronic Payment;
- 5.1 Commercial Vehicle Electronic Clearance;
- 5.5 Intermodal Freight Management;
- 6.4 Emergency Vehicle Management; and
- 8.1 Weather and Environmental Data Management

These User Services represent projects that are sufficiently challenging to initiate and support within the region but less challenging than others. The *Environmental Conditions Management* and *Weather and Environmental Data Management* areas of pursuit (i.e. RWIS) are integrated and should be pursued jointly. It is acknowledged that border security is a very prevalent issue in today's environment, as evidenced in the earlier Needs Assessment (i.e. Expedited border crossing inspection and clearance for commercial vehicles). It is anticipated that security issues would be incorporated in *5.1 Commercial Vehicle Electronic Clearance,* and *5.5 Intermodal Freight Management.*

The Opportunities Analysis resulted in nine User Services that were considered "early winners" (implementation in zero to three years), and seven User Services that should be considered for the "medium term" (implementation in four to seven years). The following is a summary rationale for delaying implementation of seven of the higher priority User Services.

Traveller Services and Reservations (1.4)

Traveller Services and Reservations is very closely linked to *1.1 Traveller Information*. It is suggested that the focus be on developing a Traveller Information pilot project, and then build upon successes by expanding the system to include Traveller Services and Reservations.

Incident Management (2.2)

Although there is interest in the benefits of implementing this User Service, a specific "early winner" has not been identified by the stakeholders.

Operations and Maintenance (2.5)

This area is undergoing significant change, with the trend toward outsourcing by government agencies. The User Service requires substantial start-up funding, and the introduction of sophisticated technology to operations and maintenance activities. Equipment operators would require significant training to fully make use of the systems. Therefore, the systems must be justified based on a sound business case, and used to their full potential once implemented. These represent significant barriers to overcome before systems are implemented.

Automated Dynamic Warning and Enforcement (2.6)

Two potential "early winners" were identified, but upon closer examination, significant barriers were identified.

The first potential project focused on a rural application to provide dynamic warning to reduce collisions between vehicles and wildlife. However, the approach included the development of new technology, which would likely take considerable time and resources.

The second potential project focused on the automated enforcement in urban areas through the implementation of Red Light Cameras. A substantial barrier is the necessary changes to the legislation in the individual provinces to permit automated enforcement. This process would likely take a significant amount of time.

Commercial Fleet Management (5.6)

The large carriers already have systems under development, or in place. For further implementation, a champion is required to represent and organize the smaller operators, or to implement a system at a specific transportation hub such as an airport.

Emergency Notification and Personal Security (6.1)

This User Service is heavily reliant on public acceptance. Most systems are vehicle based, and fairly expensive. They must be acquired at the time that a vehicle is acquired, or acquired using an after-market service. The slow acceptance rate will delay widespread implementation.

Disaster Response and Management (6.3)

The implementation of this User Service may be accelerated as a result of the events of September 11, 2001. However, many hurdles must be overcome to achieve a greater level of co-operation and co-ordination between agencies, and to develop the scope and components of disaster response and management plans, before the ITS strategies are implemented.

The recommended timeframes will be taken into account during the development of the deployment plan.

Exhibit 3.5 – Confirmation Of User Services For Deployment

USER SERVICES	STEP 2			STEP 3		
	PRIORITY (NEEDS ASSESSMENT AND SWOT ANALYSIS)	USER SERVICES ASSESSMENT RATING	EARLY WINNER ASSESSMENT (FOCUS GROUPS)	USER SERVICES ASSESSMENT – OPPORTUNITIES ANALYSIS RATING	USER SERVICES ASSESSMENT – KEY BARRIERS & ACTIONS TO RESOLVE	RECOMMENDED TIMEFRAMES
1.1 TRAVELLER INFORMATION	MED/HIGH	HIGH	VERY GOOD	EARLY WINNER	SOME BARRIERS BUT GOOD ACTION PLAN – EARLY WINNER	EARLY WINNER
1.4 TRAVELLER SERVICES/RESERVATIONS	MED	MED/HIGH	VERY GOOD	EARLY WINNER	SOME BARRIERS BUT GOOD ACTION PLAN – EARLY WINNER	MEDIUM TERM
2.1 TRAFFIC CONTROL	MED/HIGH	HIGH	GOOD/VERY GOOD	EARLY WINNER	FEW BARRIERS AND GOOD ACTION PLAN – EARLY WINNER	EARLY WINNER
2.2 INCIDENT MANAGEMENT	MED/HIGH	MED	VERY GOOD	EARLY WINNER	SOME BARRIERS AND FAIRLY GENERAL ACTION PLAN – MEDIUM TERM	MEDIUM TERM
2.4 ENVIRONMENTAL CONDITIONS MANAGEMENT	HIGH	HIGH	VERY GOOD	EARLY WINNER	FEW BARRIERS AND FAIR ACTION PLAN – EARLY WINNER	EARLY WINNER
2.5 OPERATIONS AND MAINTENANCE	HIGH	MED		MEDIUM TERM	SEVERAL BARRIERS AND FAIRLY GENERAL ACTION PLAN – MEDIUM TERM	MEDIUM TERM
2.6 AUTOMATED DYNAMIC WARNING AND ENFORCEMENT	HIGH	MED/HIGH	EXCELLENT	EARLY WINNER	SEVERAL BARRIERS AND PRODUCT DEVELOPMENT REQUIRED – MEDIUM TERM	MEDIUM TERM
3.1 PUBLIC TRANSPORT MANAGEMENT	MED	HIGH	VERY GOOD	EARLY WINNER	SOME BARRIERS AND STRONG ACTION PLAN – EARLY WINNER	EARLY WINNER

Exhibit 3.5 – Confirmation Of User Services For Deployment

USER SERVICES	STEP 2			STEP 3		
	PRIORITY (NEEDS ASSESSMENT AND SWOT ANALYSIS)	USER SERVICES ASSESSMENT RATING	EARLY WINNER ASSESSMENT (FOCUS GROUPS)	USER SERVICES ASSESSMENT – OPPORTUNITIES ANALYSIS RATING	USER SERVICES ASSESSMENT – KEY BARRIERS & ACTIONS TO RESOLVE	RECOMMENDED TIMEFRAMES
4.1 ELECTRONIC PAYMENT SERVICES	LOW/MED	HIGH	VERY GOOD	EARLY WINNER	SOME BARRIERS AND FAIR ACTION PLAN – MEDIUM TERM	EARLY WINNER
5.1 COMMERCIAL VEHICLE ELECTRONIC CLEARANCE	MED	HIGH	EXCELLENT	EARLY WINNER	SOME BARRIERS AND GOOD ACTION PLAN – EARLY WINNER	EARLY WINNER
5.5 INTERMODAL FREIGHT MANAGEMENT	MED		VERY GOOD	EARLY WINNER	SEVERAL BARRIERS AND GOOD ACTION PLAN – EARLY WINNER	EARLY WINNER
5.6 COMMERCIAL FLEET MANAGEMENT	MED	HIGH	VERY GOOD	EARLY WINNER	SEVERAL BARRIERS AND REQUIRES PRIVATE SECTOR INITIATIVE – MEDIUM TERM	MEDIUM TERM, BUT LED BY PRIVATE SECTOR
6.1 EMERGENCY NOTIFICATION AND PERSONAL SECURITY	MED/HIGH	MED	-	MEDIUM TERM	-	MEDIUM TERM
6.3 DISASTER RESPONSE AND MANAGEMENT	MED/HIGH	MED	-	MEDIUM TERM	BARRIERS NOT WELL KNOWN AND FAIRLY GENERAL ACTION PLAN – MEDIUM TERM	MEDIUM TERM
6.4 EMERGENCY VEHICLE MANAGEMENT	MED/HIGH	MED/HIGH	GOOD	MEDIUM TERM	SOME BARRIERS AND FAIR ACTION PLAN – MEDIUM TERM	EARLY WINNER
8.1 WEATHER AND ENVIRONMENTAL DATA MANAGEMENT	HIGH	MED/HIGH	-	EARLY WINNER	FEW BARRIERS AND FAIR ACTION PLAN	EARLY WINNER

4. ITS PROGRAM FRAMEWORK

The refined User Service Plan identified a number of User Services that are expected to meet the ITS needs of Atlantic Canada. The ITS Program reflects the functional requirements for each of these User Services, as tailored to the needs of the region. This section applies the ITS Architecture for Canada to assist in the definition of an ITS Program for Atlantic Canada. It does so by:

- Defining the functional requirements related to the User Services that are specifically relevant to Atlantic Canada;
- Identifying the enabling technologies that address these functional requirements; and
- Defining the User Sub-Services and applications that employ these technologies.

User Services define ITS in terms of broad categories of services. The ITS Architecture for Canada defines User Services in terms of what they are supposed to accomplish for the end-user. A broad range of users is considered, including the travelling public as well as many different types of system operators. The application of the concept of User Services facilitates the identification of high level services that will be provided to address identified problems and needs.

The ITS Architecture for Canada further sub-divides User Services into User Sub-Services. These were developed to more fully define the range of possible services provided. In addition, these User Sub-Services can be mapped directly to Market Packages, i.e. the system delivery components intended to meet the identified needs.

The descriptions provided for the User Services and Sub-Services in this document are substantially taken from those provided in the ITS Architecture for Canada, but have been edited to reflect the priorities, needs and context for Atlantic Canada.

It is anticipated that a given stakeholder within the Atlantic Region will have an interest in a specific User Service or set of related User Services, such as the CVO bundle. This section serves as a reference tool to enable the stakeholder, or project participants, to source high-level statements of functionality, ITS Architecture references, and key enabling technologies for the User Services that are of particular interest.

The remainder of the ITS Program Definition has been subdivided into the following interrelated activities. Provided below is a brief description of each component:

- **Functional Requirements (Section 4.1)** – This section outlines the functional requirements for each of the ITS User Services previously identified as important to the Atlantic Region.
- **Enabling Technologies (Section 4.2)** – This section summarizes a variety of practical technologies that can be combined to deliver the functionality as outlined in Section 2. The current state of maturity for each of these technologies is identified, as well as local availability of these products.
- **User Sub-Services (Section 4.3)** – This section provides further refinement of the User Services with reference to the applicable Market Packages.

To assist in the interpretation of the technical terminology contained in this document, a Glossary of Terms is provided in the appendices.

A more detailed discussion regarding the enabling technologies identified in Section 4.2 is provided as Appendix H.

4.1 FUNCTIONAL REQUIREMENTS

The Canadian ITS Architecture identifies thirty-five User Services. These User Services document what ITS should accomplish to fulfill user needs. A broad range of users must be considered, including the travelling public as well as many different types of system operators. User Services definitions assist in project planning exercises by establishing the high level services that will be provided to address identified problems and needs.

The refined User Service Plan identified a total of sixteen User Services of relevance to Atlantic Canada. The following sections outline the intended functionality for each of these "candidate User Services". The functionality for each User Service is defined according to the following headings (where applicable):

- Surveillance;
- Data processing;
- Control;
- Traveller interface;
- Navigation;
- In-vehicle sensors; and
- Communications.

4.1.1 Traveller Information (User Service 1.1)

The Traveller Information User Service provides travellers with information to assist them in making mode choices and route decisions. Information is integrated from various transportation modes and other information sources and is presented to the traveller, pre-trip or en-route, for decision-making. The following functional areas are required in support of this User Service.

- Surveillance – Traveller Information shall provide for the collection of traffic conditions, road conditions, event/incident advisories, general public transportation, toll and parking information, and air quality and weather information.
- Data Processing – Traveller Information shall collect surveillance data from a variety of sources and integrate into a common database (i.e. data fusion). Algorithms validate data to estimate in near real-time current traffic conditions, road conditions, transit services, ride share/ride match, parking management, and pricing information for dissemination to the public.
- Traveller Interface – Traveller Information shall support both interactive and broadcast capabilities to access information prior to a trip or en-route. Information is conveyed using a variety of media that includes text, voice, advisory, map display and video.

- Communications – Wide area coverage is required for en-route traveller information. Broadcast and two-way (interactive) en-route traveller information is transmitted over low bandwidth wireless communication systems. Broadcast and two-way (interactive) pre-trip traveller information is transmitted over higher bandwidth wireline communication systems to support feature-rich traveller interfaces (e.g. interactive map display).

4.1.2 Traveller Services and Reservation (User Service 1.4)

The Traveller Services and Reservation User Service provides the traveller with access to "yellow pages" type information regarding a variety of travel-related services and facilities. The information is accessible to the traveller in the home or office to support pre-trip planning and while en-route, either in the vehicle or at public facilities such as public transit terminals or highway rest stops. The following functional areas are required in support of this User Service:

- Surveillance – Traveller Services and Reservation shall provide for the collection of information as defined under 1.1 Traveller Information supplemented with access to yellow pages, services purchases and reservation services.

- Data Processing – Traveller Services and Reservation shall integrate Traveller Information, with "yellow pages" directories, and services/accommodations booking/purchases into a consolidated reference system.

- Traveller Interface – The Traveller Services and Reservation User Service shall provide an interactive interface to access information prior to a trip or en-route. Traveller Services and Reservation shall provide an interactive interface for yellow pages directory access, services purchases, reservation services, and status information on parking facilities.

- Communications – Two-way (interactive) pre-trip traveller information is transmitted over higher bandwidth wireline communication systems to support feature-rich traveller interfaces. Interactive en-route traveller information is transmitted over lower bandwidth wireless communication systems.

4.1.3 Traffic Control (User Service 2.1)

The Traffic Control User Service manages the movement of traffic on streets and highways. It includes surface street controls such as traffic signal systems, adaptive traffic control systems and freeway control techniques such as ramp metering and lane control.

- Surveillance – Traffic Control shall provide for the collection of traffic conditions, and road conditions data using road condition sensors, environmental sensors and other surveillance equipment such as video monitoring.

- Data Processing – Traffic Control shall provide data processing for:

    - Fixed device communication;

    - Data pre-processing and validation; and

  - Processing algorithms for monitoring traffic environmental and road conditions, identification and verification of incidents, and local surface street control and/or arterial traffic management.

- Control Strategies - Traffic Control shall provide control strategies to support daily operations and incident management (refer to 2.2 Incident Management) and shall include:
  - Surface street control;
  - Highway control; and
  - Regional traffic control.

- Traveller Interface – Traffic Control shall support the dissemination of traffic information to drivers and vehicles using roadway equipment, and dissemination of information to users and Information Service Providers (ISP) for distribution to a wider audience for either en-route, or pre-trip planning purposes (refer to 1.1 Traveller Information).

- Communications – A range of two-way wireline and wireless communications systems may be used to support the various devices employed under this User Service. Low bandwidth two-way communications systems are used for communications between the control centre and field devices. High bandwidth communication systems are required for the transmission of video. High-speed networks are required for digital data and video transmission between control centres.

4.1.4 Incident Management (User Service 2.2)

The Incident Management User Service enhances traffic monitoring and control capabilities to identify incidents, formulate response actions, and support initiation and ongoing co-ordination of those response actions.

- Surveillance – Incident Management shall use the surveillance equipment deployed under the Traffic Control User Service for the collection of traffic conditions, and road conditions using road condition sensors, environmental sensors and other surveillance equipment. Call centres will provide incident detection capabilities in rural areas, and supplemental information for incident detection on instrumented roadways.

- Data Processing – Incident Management shall use the incident detection capabilities included in the Traffic Control User Service for incident detection. Automated processes shall be employed to initiate and manage response to the incident site.

- Control Strategies - Incident Management shall manage both scheduled and unscheduled incidents so that the impact to the transportation network and traveller safety is minimized. The incident response may include co-ordination with emergency management, traffic control strategy modifications and dissemination of information to affected users.

- Traveller Interface – Incident Management shall:

  - Provide regional co-ordination with other traffic management and emergency management centres, weather service entities, and event promoters;

  - Disseminate traffic information to drivers and vehicles using roadway equipment; and

  - Disseminate information to users and the ISP for distribution to a wider audience for either en-route, or pre-trip planning purposes.

- Communications – A range of two-way wireline and wireless communications systems may be used to support the various devices employed for this User Service. Low bandwidth two-way communications systems are used for communications between the control centre and field devices. High bandwidth communication systems are required for the transmission of video. High-speed networks are required for digital data and video transmission between control centres and the emergency management system. Wireless communications systems are required in rural areas for incident detection and response.

4.1.5 Environmental Conditions Monitoring (User Service 2.4)

The Environmental Conditions and Monitoring User Service provides for the collection and processing of road weather information to optimize winter maintenance. In addition, road weather information and forecasts provide inputs to other services such as Traffic Management and Traveller Information to increase safety and efficiency.

- Surveillance – Environmental Conditions Monitoring shall utilize fixed sensor stations on and about the roadway, to provide information on road and weather conditions. Road condition information may include pavement moisture content and temperature. Weather condition information may include precipitation, temperature, wind direction and speed and the presence of fog. Additional environmental hazards may be monitored along site-specific routes or locations, prone to these hazards such as mudslides or fire (smoke).

- Data Processing – Environmental Conditions Monitoring shall analyze environmental data to detect and forecast environmental hazards, which can be used to more effectively deploy road maintenance resources, issue general traveller advisories, improve emergency management and response, and support location specific warnings to drivers. Environmental data may be obtained from system surveillance equipment, the national meteorological services and aviation services (refer to 8.1 Weather and Environmental Data Management).

- Control Strategies –Environmental Conditions Monitoring shall increase the efficiency of plowing operations and the application of anti and de-icing materials through the prediction of weather conditions and the monitoring of roadway conditions.

- Traveller Interface – Environmental Conditions Monitoring shall disseminate information regarding environmental hazards through connections with traffic management systems, traveller information systems and information services providers. Environmental Conditions Monitoring shall use in-vehicle signing to inform maintenance vehicle operators of detected road and weather conditions. In-vehicle signing may use audio, visual and tactile interface technologies.

- In-Vehicle Sensors – Environmental Conditions Monitoring shall use sensors located on the maintenance vehicles to monitor and report the application of anti- and de-icing materials.

- Communications – Low bandwidth two-way wireline and wireless communication is required between field devices and the traffic management centre. Two-way wide area wireless communications system may be used to communicate with maintenance vehicles.

4.1.6 Operations and Maintenance (User Service 2.5)

The Operations and Maintenance User Service provides road authorities, as well as contractors with the resources to manage the operations and maintenance of vehicle fleet and equipment assets, and monitor and manage traffic flow around work zone areas.

- Surveillance – Operations and Maintenance shall:

  - Use road weather information as collected under the Environmental Conditions Monitoring User Service;

  - Monitor maintenance vehicle (e.g. snowplows and sand/salt trucks) location, vehicle status, and the output of sensors (such as environmental or road surface sensors), which are mounted on the vehicle; and

  - Use roadside sensors to monitor traffic in the vicinity of the work zone.

- Data processing – Operations and Maintenance shall process maintenance resource requests with the other available current and archived information (refer to Environmental Conditions Monitoring) to dynamically provide optimized maintenance assignments.

- Control Strategies – Operations and Maintenance shall use roadside elements to control traffic in the vicinity of the work zone.

- Traveller Interface – Operations and Maintenance shall provide the ability for the maintenance and construction driver to exchange information with the operation centre.

- Communications – Low bandwidth two-way wireline and wireless communication is required between field devices and the traffic management centre. Two-way wide area wireless communications system may be used to communicate with maintenance vehicles.

4.1.7 Automated Warning and Enforcement (User Service 2.6)

The Automated Dynamic Warning and Enforcement User Service provides systems that warn vehicles or motorists of imminent danger, and provide electronic enforcement of traffic control and regulations.

- Surveillance – Automated Warning and Enforcement shall monitor vehicles, roadway weather conditions, road surface conditions, traffic conditions, and obstacles or wildlife in the roadway.

- Data Processing – Automated Warning and Enforcement shall process:

  - Surveillance data for driver notification of dangerous conditions (i.e. wildlife on roadway); and
  - Vehicle and traffic signal display status for enforcement purposes (i.e. red light camera).

- Control Strategies – Automated Warning and Enforcement shall dynamically vary speed limits in response to roadway conditions and enforce roadway traffic signals and speed limits.

- Traveller Interface – Automated Warning and Enforcement shall disseminate warning information to the roadway user using dynamic message signs.

- Communications – A range of two-way wireline and wireless communications systems may be used to support the various devices employed under this User Service. Often, surveillance data can be processed remotely at the roadside, reducing communications requirements.

4.1.8 Public Transport Management (User Service 3.1)

The Public Transport Management User Service applies tracking and communications functions to various public transportation modes to improve service to the public. It includes operation of vehicles and facilities, planning and scheduling, and personnel management.

- Surveillance – Public Transport Management shall track the transit vehicle position.

- Data Processing – Public Transport Management shall:
  - Process vehicle location information to update the transit schedule for dissemination to patrons, and adjust transit vehicle operations to maintain schedule compliance;
  - Process and store data as necessary for electronic payment (refer to Electronic Payment Services);
  - Monitor the status of transit vehicle critical systems for transit maintenance activities; and
  - Coordinate with multiple transit and traffic agencies to improve service coordination.

- Control Strategies – Public Transport Management shall provide local co-ordination between the transit vehicle and the individual intersection for signal priority. Real time operations adjustments can be implemented to optimize service.

- Traveller Interface – Public Transport Management shall make real-time schedule information available via the Traveller Information User Service (refer to 2.1 of this document – Traveller Information) for dissemination.

- In-Vehicle Sensors – Public Transport Management shall provide the capability to monitor transit vehicle positioning, critical system status, passenger loading, and allow for electronic fare payment.

- Communications – Two-way low bandwidth wireless communications between the transit vehicle and transit management system is used for relaying vehicle position, and system status. Control measures (signal priority) are typically implemented using low bandwidth wireless roadside communication systems. Some information, such as vehicle maintenance data can be batch downloaded using short range communications.

4.1.9 Electronic Payment Services (User Service 4.1)

The Electronic Payment Services User Service allows travellers to pay for transportation services by electronic means. It may also serve broad non-transportation functions and may be integrated with credit and debit cards in banking and other financial transactions.

- Surveillance – Electronic Payment Services shall provide transportation operators with the ability to detect and process violators.

- Data Processing – Electronic Payment Services shall:

  - Provide toll operators with the ability to locally or centrally process transactions electronically;

  - Provides electronic processing of parking fees;

  - Allows for the fare payments onboard transit vehicles using electronic means; and

  - Processing includes account reconciliation using pre-paid or credit accounts.

- In-Vehicle Sensors – Electronic Payment Services shall use short-range communications with in-vehicle equipment for electronic toll collection and parking payment. Electronic Payment Services shall use transit in-vehicle systems to allow transit fare payment.

- Communications – Dedicated short-range communication between the roadway equipment and the vehicle is required. Dedicated high bandwidth two-way network communications between the toll collection equipment, transportation authorities and the financial infrastructure is required to support fee collection and processing.

4.1.10 Commercial Vehicle Electronic Clearance (User Service 5.1)

The Commercial Vehicle Electronic Clearance User Service consists of both domestic and international border electronic clearances. Domestic electronic clearance allows commercial vehicles to continue past inspection stations without stopping. International border clearance allows vehicles to bypass international border checkpoints without stopping, or at least expedited checks. As a vehicle approaches an inspection station or checkpoint, vehicle to roadside communications take place that identify the vehicle and make available to authorities the necessary data about credentials, vehicle weight, safety status, cargo, and occupants. Enforcement personnel can then select potentially unsafe vehicles for inspection and allow safe and legal vehicles to bypass the inspection station/checkpoint.

- Surveillance – Commercial Vehicle Electronic Clearance shall provide automated clearance at roadside check facilities. The roadside check facility will be equipped with sensors to identify and weigh vehicles. Vehicle and cargo status monitoring capabilities are secondary technologies enabling this ITS application.

- Data Processing – Commercial Vehicle Electronic Clearance shall use surveillance data to retrieve snapshots of critical carriers, vehicle, and driver data. When making the "Pass/Need to Stop" determination, vehicle/carrier safety information, vehicle credentials, driver credentials, driver status, and vehicle weight information shall be checked.

- Control Strategies – Commercial Vehicle Electronic Clearance shall include equipment needed to signal "Pull-in for Safety Inspection".

- Traveller Interface – Commercial Vehicle Electronic Clearance shall provide messaging to drivers approaching the inspection station/checkpoint using roadside display or in-vehicle signalling.

- In-Vehicle Sensors – Commercial Vehicle Electronic Clearance shall use a range of on-board sensor technologies that monitor vehicle condition, performance and safety.

- Communications – Low bandwidth two-way communications systems are used to allow a compliant vehicle/driver/carrier to pass roadside facilities at highway speeds.

4.1.11 Intermodal Freight Management (User Service 5.5)

The Intermodal Freight Management User Service provides systems that will monitor the status of freight in-transit and at freight terminals.

- Surveillance – Intermodal Freight Management shall track and monitor intermodal containers and intermodal freight systems anywhere in the transportation system.

- Data Processing – Intermodal Freight Management shall support the monitoring of the container and its contents during the entire pickup-transport-drop-off period. This includes determining the location of a container regardless of transportation mode, and if appropriate monitors measured parameters of the container contents (e.g. temperature, shock and vibration, etc.)

- Traveller Interface – Intermodal Freight Management shall provide tracking and monitoring information to freight customers, fleet managers, and logistics service providers.

- Communications – Short-range two-way wireless communication systems are used between the container and the terminal and customs agencies.

4.1.12 Commercial Fleet Management (User Service 5.6)

The Commercial Fleet Management User Service provides real-time communications for vehicle location, dispatching and tracking between commercial vehicle drivers, dispatchers, and intermodal transportation providers, thereby reducing delays for drivers and providing commercial drivers and dispatchers with real-time routing information in response to congestion or incidents.

- Surveillance – Commercial Fleet Management shall monitor vehicle location, onboard vehicle sensors (e.g. fuel gauge), cargo and cargo condition (e.g. temperature). Information on traffic and weather conditions shall be obtained from ISP's.
- Data Processing – Commercial Fleet Management shall provide:
  - The vehicle with dispatch instructions and can process and respond to requests for assistance;
  - Real-time information to clients on cargo status; and
  - Support vehicle (tractor and trailer) maintenance by recording vehicle mileage and repairs.
- Traveller Interface – Commercial Fleet Management shall provide real-time communication between the driver and the dispatcher/operator.
- In-Vehicle Sensor – Commercial Fleet Management shall use an in-vehicle processor to interface to its sensors (e.g. GPS receiver) and to the communications data link.
- Navigation and Guidance – Optimized routing instructions shall be conveyed to the commercial vehicle based upon current traffic and weather conditions.
- Communications – This User Service uses area-wide low bandwidth wireless communications to communicate with vehicle en-route.

4.1.13 Emergency Notification and Personal Safety (User Service 6.1)

The Emergency Notification And Personal Security User Service provides the capability for the user to manually initiate a distress signal for incidents like mechanical breakdown or non-injury collisions. An automated system would help mitigate the consequences of a serious collision by automatically sending information regarding the location, nature and severity of the collision to an emergency services dispatcher and/or to hospital and emergency room personnel.

- Surveillance – Emergency Notification and Personal Safety shall receive a request for emergency assistance from a user (driver, non-driver, and pedestrian) and locate the user.
- Data Processing – Emergency Notification and Personal Safety shall locate the user and initiate an appropriate response based on information obtained.
- Control Strategies – Emergency Notification and Personal Safety shall stop stolen vehicles at the request of the user.
- Traveller Interface – Emergency Notification and Personal Safety shall provide the capability to manually initiate a distress signal, and automatically initiate a distress signal if the user is incapacitated.

- In-Vehicle Sensors – Emergency Notification and Personal Safety shall automatically initiate a request for assistance based on information obtained from in-vehicle sensors and vehicle positioning applications.

- Communications – Area-wide low-bandwidth wireless communications is required with voice communications as an option.

4.1.14 Disaster Response and Management (User Service 6.3)

The Disaster Response and Management User Service co-ordinates disaster response strategies from a virtual control centre, and disseminates information to agencies and individuals on traffic conditions, diversion routes etc.

- Surveillance – Disaster Response and Management shall collect information from the transportation agencies, to help monitor the disaster and the status of the response.

- Data Processing – Disaster Response and Management shall:

  - Coordinate the roadway transportation management centres with the overall command authority that is leading the disaster response;

  - Co-ordinate emergency management and maintenance management fleets and activities;

  - Coordinate transit assets to support evacuation; and

  - Exchange information with traffic management centres to control roadway usage.

- Traveller Interface – Disaster Response and Management shall disseminate evacuation guidance to travellers via traffic management ISP's (refer to 1.1 Traveller Information).

- Communications – High-bandwidth wireline communication networks are required between traffic management centres for coordinated disaster response.

4.1.15 Emergency Vehicle Management (User Service 6.4)

The Emergency Vehicle Management Service User Service is oriented towards reducing the time from the receipt of notification of an incident by an emergency services dispatcher, and the arrival of emergency vehicles on the scene. It includes emergency vehicle fleet management, route guidance to the incident scene or a suitable hospital, and pre-emption of traffic signals on an emergency vehicle's route to receive more green displays.

- Surveillance – Emergency Vehicle Management shall provide for tracking the location of emergency vehicles. Real-time traffic conditions for emergency routes are obtained from the ISP.

- Data Processing – Emergency Vehicle Management shall:

  - Enable safe and rapid deployment of appropriate resources to an emergency;

  - Co-ordinate the emergency response between agencies;
  - Select the preferred route for the emergency vehicle;
  - Track the progress of emergency vehicles to the emergency scene; and
  - Re-route the emergency vehicle based on roadway conditions.
- Control Strategies – Emergency Vehicle Management shall interact with the traffic signal control system to provide pre-emption to the emergency vehicle along its selected route. Alternatively, the emergency vehicle would be equipped with dedicated short-range communications for local signal pre-emption.
- Navigation and Guidance – Emergency Vehicle Management shall reroute the emergency vehicle depending on roadway conditions.
- Communications – Area-wide low-bandwidth wireless two-way communications between the emergency vehicle and the emergency management system is required for vehicle tracking and guidance.

4.1.16 Weather and Environmental Data Management (User Service 8.1)

The Weather and Environmental Data Management User Service provides system-wide gathering, fusion, and dissemination of information on roadway weather conditions and forecasts.

- Surveillance – Weather and Environmental Data Management shall use roadside sensor systems and weather sensors mounted on maintenance vehicles to collect roadway environmental data, while the national meteorological services provides the basic weather data and modeling functions.
- Data Processing – Weather and Environmental Data Management shall aggregate data from multiple sources and produce a consolidated data source. This data shall be combined with weather predictions for modeling purposes to predict roadway conditions (refer to Environmental Conditions Monitoring).
- Communications – High-bandwidth wireline communications networks are required between centres.

4.2 ENABLING TECHNOLOGIES

The candidate ITS User Services employ many technologies, each with unique performance, cost and maturity characteristics. Many of these technologies are commercially available and would expose the implementing authority to little technical risk in the near term. The most problematic technology implications exist where a required ITS function is not presently supported by any cost-effective, commercially available technology. In a few instances, required technologies may not exist or may be too costly and/or unreliable for commercial application. ITS services that are dependent on such technologies require further research and development before a commercially viable product will be available.

This section identifies and describes the technologies associated with each User Service, defines the maturity of the particular technology, and briefly discusses its local availability in Atlantic Canada.

4.2.1 Technology Requirement Relationships

Exhibit 4.1 identifies functional groups of technologies and relates each of them to the candidate ITS User Services. Each column in the table represents a general technology area that is required to deploy ITS services. The technology requirements for each ITS Service are presented in the body of the table using the following icons:

> ■: The opaque (black) squares denote a basic relationship between the candidate ITS User Service and the technology area. This assignment indicates that the technology area is fundamental to the ITS service.
>
> ☐: The transparent (white) squares denote a secondary relationship between the candidate ITS User Service and the technology area. This assignment indicates that the technology would allow a partially implemented ITS Service to be fully implemented, or a basic definition of the service expanded to a broader one. Use of this technology area is desirable but not necessarily required for candidate ITS User Service implementation.

The candidate ITS User Services are ultimately at a very coarse resolution level for the purposes of this technology assessment. However, this will suffice to identify the areas that are likely to be deployable as near term services (by 2010) and which are likely to be long term services (after 2010).

Exhibit 4.1 – Technology Areas Associated with the Priority User Services for Atlantic Canada

Atlantic ITS Services	Surveillance										Data Processing	Control			Traveler I/F			Navigation	In-Vehicle Sensors	Communications				
	Traffic	Vehicle Status	Environment	Vehicle Monitoring	Driver Monitoring	Cargo Monitoring	Obstacle Ranging	Lane Tracking	Security	Location Determination		Signals	Signs	Vehicle	Driver	Traveler	Operator			Extended Range 2-Way	DSRC	Vehicle-Vehicle	Broadcast	Fixed Wireline
1.1 Traveller Information	■		□							□	■				■	■	■	□		■			■	■
1.4 Traveller Services and Reservation										□	■				■	■	■	□		■				■
2.1 Traffic Control	■		□	□						□	■	■	■				■			□	□			■
2.2 Incident Management	■			■						■	■	■	■				■			■				■
2.4 Environmental Conditions Monitoring		■	■	□							■		□		□		■		□	□				■
2.5 Operations and Maintenance	□		■	■	□					■	■	□	□	□	□		□		□	■				
2.6 Automated Warning and Enforcement	■		■								■	■	■											
3.1 Public Transport Management				□	□					■	■				□	□	■		□	■	□			
4.1 Electronic Payment Services									■	□	■									□	■			■
5.1 Commercial Veh Electronic Clearance		□		□		□			□		■	■	■		■		■	□	□	□	■			■
5.5 Intermodal Freight Mgt.				□		■			■	■	■				■		■			■	■			
5.6 Commercial Fleet Mgt				■					□	■	■				■		■		□	■	■			□
6.1 Emergency Notification and Personal Safety		□								■	■				■	■	■			■				■
6.3 Disaster Response and Management									■		■									□				■
6.4 Emergency Vehicle Management				□					■	■	■				■		■	□	□	■	□			■
8.1 Weather and Environmental Data Mgt			■								■												□	■

4.2.2 Technology Areas

This section includes a discussion of the functional groups introduced in Section 4.1 (i.e. surveillance, data processing, control, traveller interface, navigation, in-vehicle sensors, and communications) in terms of sub-groups or 'technology areas'. Exhibit 4.2 summarizes the technology areas that have been analyzed within each of the candidate ITS User Services and the relative maturity of that particular technology. A more detailed description of each technology is included within Appendix H.

The maturity assignments are defined as follows (referring to the year 2010 as the end of the "near term" deployment window):

● **Mature:** Current commercially available technology supports the identified ITS requirements in this area. Deployment of the candidate ITS Services is not predicated on further research and development of these technologies. *Candidate ITS Services with dependencies only on these mature technologies should be deployable prior to 2010 with low risk.*

◕ **Mature with rapid innovation:** Current commercially available technology supports the identified ITS requirements. The area is one of rapid technology growth that indicates that the basic support provided by current technologies will likely be superseded within the period to 2010. While further research and development is not required to support ITS, future deployment may benefit from technology enhancements that should not be precluded by excessive rigidity in the architecture or deployment definitions. *Candidate ITS Services with dependencies only on this class of technologies should be deployable prior to 2010 with low performance risk and medium cost risk, based on obsolescence.*

◐ **Mixed:** This technology area is required to satisfy a range of ITS requirements including some that are not supported by current technology. Useful services may be deployed using currently available technologies; however, satisfying all ITS Service requirements will require additional research and development to bolster the identified deficiencies. Where this assignment is made, the associated description in highlights the specific areas where technology advancement is required. *Candidate ITS Services with dependencies only on these "mixed" technologies may not be deployable prior to 2010 without significant technical risk.*

◔ **Immature:** Additional research and development is required before technologies in this area can be cost-effectively and reliably applied to support the candidate ITS Services. In some cases, potentially suitable technologies have been applied in defence and/or aerospace applications, but not in commercial transportation applications. Additional research and development is still required in these areas to address the unique mass production, safety, and cost issues associated with larger commercial markets. *Candidate ITS Services with dependencies only on these immature technologies may not be deployable prior to 2010 under any risk scenario.*

Exhibit 4.2 takes the summary one step further by identifying the local market availability of the technology in terms of the presence of relevant suppliers and service providers. This technology assessment will suffice to identify areas that are likely to be deployable in Atlantic Canada as near term services (by 2010) and which are likely to be long term services (after 2010).

The identification of a technology area as immature is not the same as an absolute prediction that deployments will not occur without significant further research. There are numerous examples where relatively immature technologies have been applied in successful products, depending on the customer's needs and expectations. Where the need is great enough, creative providers will find other approaches that can be used for interim deployments. For example, technologies that automate vehicle occupant sensing for the purposes of determining compliance with HOV requirements are in their infancy. However, special rules and manned surveillance stations with high speed cameras are currently being used in several locations to support vehicle occupant sensing.

Although the relationship is not absolute, the deployment timing for the dependent candidate ITS Services will be influenced by the timing of the required technology advancements. Unfortunately, accurately forecasting technology development timing is extremely difficult. This timing is dependent upon the current status of the required technology and the quantity and productivity of the research that will be performed in the area.

Exhibit 4.2 – Enabling Technologies Summary

Technology Area	Technology	Description	Maturity	Availability		
				Local	Central and Western Canada	North America
1. Surveillance Section						
Traffic Table B 1 (Appendix B)	Loop Mats	generate an electromagnetic field designed for temporary use	◖			X
	Pressure Plates	detect axles thru electrical contact	◖		X	
	Magnetometer	measure change in Earth magnetic field	◖			X
	Inductive loop	wireline buried in pavement	●	X		
	Magnetic Probes	measures change in Earth magnetic field	◖		X	
	Sensing Cable	technology limited to detect axles	◔		X	
	Video Imaging	uses the visible light and near infrared bandwidths to sensor traffic parameters	◕		X	
	Radar	2 types Doppler radar - unable to measure presence, and True presence microwave - detects volume, presence and calculates speeds	◕		X	
	Laser	technology is sensitive to mounting height and position and noise	◔			X
	Ultrasonic Sensing	transmit and receive an acoustic wave that is analyzed to determine vehicle volume	◔			X
	Automatic Vehicle Identification	may be used to provide road link travel time data between antennae for freeway and arterial networks	◖		X	
Vehicle Status Table B 2	Vehicle Classification	sensors which determine individual characteristics of passing vehicles (e g vehicle length, weight, no of axles, lane position, speed)	◕		X	
	Vehicle Emissions	enforcement application technologies that monitor emissions, passenger counts and operational status for specific vehicles are less mature	◖		X	
Environment Table B 3	Environmental Sensors	technologies which monitors local climate (temperature, humidity, precipitation, wind, pollution) and road surface status (dry, wet, ice, snow)	●	X		
Vehicle Monitoring Table B 4	CCTV Cameras	provides visual surveillance and confirmation of incidents, may be used to detect incidents, and to monitor environmental conditions, supports vehicle classification and enforcement	●	X		
Driver Monitoring Table B 5	Driver Monitoring Sensors	technologies which monitor driver condition by monitoring driving characteristics and/or other psycho-physiological symptoms associated with impaired performance	◔			X
Cargo Monitoring Table B 6	Cargo Monitoring Sensors	technologies which monitor various indicators of cargo status such as load distribution, temperature, acceleration pressure	●		X	

Technology Area	Technology	Description	Maturity	Availability		
				Local	Central and Western Canada	North America
Obstacle Ranging Table B.7	Obstacle Ranging Sensors	technologies which detect and characterize potential obstacles (other vehicles, people, road debris) in a vehicle's vicinity	◔			X
Lane Tracking Table B.7	Lane Tracking Sensors	technologies on board which monitor the position of the vehicle with respect to travel lane	◔			X
Security Table B.8	Security Sensors	technologies which provide surveillance of and restrict access to secure public areas such as card readers, CCTV	●	X		
Location Determination Table B.9	GPS	technologies which determine absolute position	◕	X		
2. Data Processing Section						
Algorithms Table B.10	custom software packages for automatic incident detection, real-time signal optimization, route optimization, traffic simulation	e.g. McMaster algorithm, SCOOT (Split Cycle Offset Optimization Technique), INTEGRATION, TRANSYT-7F	◐		X	
3. Control Section 4.2.6						
Information Management Table B.10	Regional traffic control	encompasses the communications links and integrated control strategies to enable integrated interjurisdictional traffic control	◕		X	
	Incident Management Systems	manages both predicted and unexpected incidents to impact to safety is minimized			X	
Signals Table B.11	UTC Systems	Traffic signal control, limited ATMS abilities	●	X		
Signs Table B.12	Light Emitting Diode	uses pixels comprised of clusters of hi-intensity LEDs	●		X	
	Liquid Crystal Displays	insufficient contrast ratios and operating temperature restrictions limit outdoor use	◐			
	Hybrid	includes fibre/flip, LED/flip, each disk has a small opening to expose the end of an illuminated fibre strand	●		X	
	Rotating Drum	No. of messages displayed depends on no. of drums and no. of sides of its drums	●	X		
Vehicle Table B.13	Vehicle Control Sensors	technologies will emerge on the market as a collection of discrete market driven features (e.g. adaptive cruise control)	◔			X
4. Traveller Interface Section						
Driver Table B.14	Driver Interface	Audio, visual and tactile interface technologies appropriate for interaction with drivers during vehicle operation (e.g. console LED, LCD, heads-up displays and synthesized speech)	◕			X
Traveller Table B.15	Traveler Interface	Same technologies as for D/I with varied constraints, extreme portability requirements restrict interface options	◕		X	

Technology Area	Technology	Description	Maturity	Availability		
				Local	Central and Western Canada	North America
Operator Table B 16	Operator Interface	Same as for T/I	◕		X	
5. Navigation Section						
Navigation Table B 17	Route Selection and Guidance	can be either autonomous or dynamic	●			X
6. In-Vehicle Sensors Section						
In-Vehicle Table B 18	In-Vehicle Sensors	The range of on-board sensor technologies which monitor vehicle condition (e.g. engine, brake, tire and suspension status) and performance (e.g. speed, braking)	●			X
7. Communications Section						
Extended Range 2-Way Table B 19	PCS	analog cellular and digital PCS services offered in Canada	●	X		
	Enhanced Specialized Mobile Radio (ESMR)	form of high mobility telephony and dispatch service	◕	X		
	Microwave	uses a no. of microwave radios, low cost, high bandwidth alternative to a fibre network build	●		X	
DSRC Table B 20	Dedicated Short Range Communications	wireless devices capable of transferring data at a high rate between mobile and/or stationary devices but are limited to a short-range	●		X	
Vehicle-Vehicle Table B 21	Vehicle to vehicle Communications	short-range wireless communications used to exchange information between vehicles in close proximity for applications such as intersection collision avoidance and vehicle platooning	◔			X
Broadcast Table B 22	Broadcast Communication	highway advisory radio, licensed AM or FM frequency. DAB is a wireless audio and data transmission system developed for point to multipoint data broadcast applications	◕		X	
Fixed Wireline Table B 23	Fixed Wireline Communications	SONET is a multiplexing industry standard for fibre optic transmission system ATM is a packetization standard which facilitates the transfer of data in cells or packets of a fixed size	●			X

4.3 USER SUB-SERVICES

The ITS Architecture for Canada identifies User Sub-Services to further refine the context for each of the User Services. The ITS Architecture for Canada provides 90 User Sub-Services for its 35 User Services. The Atlantic Provinces Regional ITS Strategic Planning Study has identified sixteen priority ITS User Services of relevance to Atlantic Canada in response to the identified existing and anticipated user needs. Specifically, the Step 2 "User Service Plan" section mapped user needs to User Sub-Services and the relevant constituent Sub-Services.

Exhibit 4.3 includes a summary of the User Sub-Services that have been identified for each of the candidate ITS User Services and a rating for the relative relevancy and maturity of the particular User Sub-Service to Atlantic Canada. A total of thirty-six User Sub-Services were identified as relevant to Atlantic Canada.

The relevancy rating assignments were based on the potential of a particular User Sub-Service to:

- Meet multiple user needs (as defined in the Step 2 "User Service Plan"); and/or
- Meet the needs of a particularly high-priority user need.

The relevancy rating assignments are defined as follows:

● **Highly Relevant:** Meets multiple user needs and/or high priority user needs.

◖ **Moderately Relevant:** Meets some user needs and/or user needs of a lesser priority.

○ **Less Relevant:** Does not directly address user needs. Has a low priority for implementation in Atlantic Canada.

Exhibit 4.3 – User Sub-Service Readiness for Deployment

User Sub-Services	Relevancy to Atlantic Canada	Maturity of Application
1.1 Traveller Information		
1.1.1 Broadcast Traveller Information	●	●
1.1.2 Interactive Traveller Information	●	◕
1.1.3 Real-Time Ridesharing Information	○	◔
1.4 Traveller Services and Reservations		
1.4.1 Traveller Yellow Pages	◖	◖
1.4.2 Services Purchases and Reservations	◖	◕
1.4.3 Parking Facility Management	◖	◖
1.4.4 Regional Parking Management	◖	◖
2.1 Traffic Control		
2.1.1 Network Flow Monitoring	◖	◕
2.1.2 Surface Street Control	●	●
2.1.3 Highway Control	◖	●
2.1.4 Regional Traffic Control	○	●
2.1.5 Traffic Information Dissemination	●	◕
2.1.6 Virtual TMC	○	◖
2.1.7 Probe-based Flow Monitoring	○	◕
2.1.8 Traffic Estimation and Prediction	○	◔

Exhibit 4.3 – User Sub-Service Readiness for Deployment

User Sub-Services	Relevancy to Atlantic Canada	Maturity of Application
2.2 Incident Management		
2.2.1 Incident Management Coordination	●	◕
2.2.2 Incident Prediction System	○	◔
2.4 Environmental Conditions Management		
2.4.1 Roadway Environmental Sensing	◖	●
2.4.2 Emissions Management	○	◖
2.4.3 Road Weather Information System	◖	●
2.4.4 Vehicle-based Sensing	◖	●
2.5 Operations and Maintenance		
2.5.1 Infrastructure Maintenance Management	◖	●
2.5.2 Smart Work Zone	●	●
2.6 Automated Dynamic Warning and Enforcement		
2.6.1 Dynamic Roadway Warning	●	◕
2.6.2 Variable Speed Limit and Enforcement	○	●
2.6.3 Signal Enforcement	◖	●
3.1 Public Transport Management		
3.1.1 Transit Vehicle Tracking	●	●
3.1.2 Transit Fixed-route Operations	◖	●
3.1.3 Passenger and Fare Management	◖	●
3.1.4 Transit Maintenance	◖	●
3.1.5 Multi-Modal Coordination	○	◖
3.1.6 Multi-modal Connection Protection	○	◖
4.1 Electronic Payment Services		
4.1.1 Electronic Toll Collection	●	●
4.1.2 Electronic Parking Payment	◖	◕
4.1.3 Transit Services Payment	◖	●
4.1.4 Traveller Services Payment	●	●
5.1 Commercial Vehicle Electronic Clearance		
5.1.1 Electronic Clearance	●	◕

Exhibit 4.3 – User Sub-Service Readiness for Deployment

User Sub-Services	Relevancy to Atlantic Canada	Maturity of Application
5.1.2 International Border Crossing Clearance	●	◖
5.1.3 Weigh-in-Motion (WIM)	●	◖
5.5 Intermodal Freight Management		
5.5.1 Freight In-Transit Monitoring	●	◖
5.5.2 Intermodal Interface Management	●	◖
5.6 Commercial Fleet Management		
5.6.1 Fleet Administration	●	◕
5.6.2 Freight Administration	●	◕
5.6.3 CVO Fleet Management	●	●
6.1 Emergency Notification and Personal Security		
6.1.1 Personal Security	●	◕
6.1.2 MAYDAY Support	●	◖
6.3 Disaster Response and Management		
6.3.1 Disaster Command and Control	●	◖
6.3.2 Disaster Information Dissemination	●	◕
6.4 Emergency Vehicle Management		
6.4.1 Emergency Response Management	●	◕
6.4.2 Emergency Vehicle Routing	●	●
8.1 Weather and Environmental Data Management		
8.1.1 Roadway and Weather Data Fusion	●	●
8.1.2 Environmental Information Dissemination	●	●
8.1.3 Roadway Meso and Micro Prediction	○	◖

4.3.1 Outline of Relevant User Sub-Services

This section provides brief descriptions for the User Sub-Services identified as 'highly relevant' in the previous section. These descriptions are substantially taken from those provided in the ITS Architecture for Canada, but have been tailored (where appropriate) to reflect the priorities, needs and context for Atlantic Canada.

This section feeds into the subsequent section covering the 'Deployment Planning' for the Strategic Plan. The aim of this section is to identify practical implementation scenarios for each of the above-noted User Sub-Services. Consequently, the Market Package(s) within the ITS Architecture for Canada that are associated with these User Sub-Services have been identified.

Traveller Information (User Service 1.1)

Broadcast Traveller Information (User Sub-Service 1.1.1)

This User Sub-Service provides the user with a basic set of ATIS services; its objective is early notification. It involves the collection of traffic conditions, road conditions, advisories, general public transportation, toll, ferry, border crossing and parking status information, incident information, air quality and weather information, and the near real time dissemination of this information over a wide area through existing infrastructures and low cost user equipment. The successful deployment of this User Sub-Service relies on the availability of real-time traveller information from roadway instrumentation, probe vehicles, or other sources.

This User Sub-Service is related to the *Broadcast Traveller Information Market Package* within the ITS Architecture for Canada.

Interactive Traveller Information (User Sub-Service 1.1.2)

This User Sub-Service provides tailored information in response to a traveller request. Both real-time interactive request/response systems and information systems are supported, that "push" a tailored stream of information to the traveller based on a submitted profile. The traveller can obtain current information regarding traffic conditions, road, weather and sea conditions, transit services, ride share/ride match, parking management, ferry status and/or scheduling, border crossing delays, and pricing information. A range of two-way wide-area wireless and wireline communications systems may be used to support the required digital communications between traveller and the information service provider. A variety of interactive devices may be used by the traveller to access information prior to a trip or en-route to include phone, kiosk, Personal Digital Assistant, personal computer, and a variety of in-vehicle devices. Successful deployment of this User Sub-Service relies on availability of real-time transportation data from roadway instrumentation, probe vehicles, parking managers, transit providers, traffic management authorities, Marine Atlantic or other means.

This User Sub-Service is related to the *Interactive Traveller Information Market Package* within the ITS Architecture for Canada.

Traffic Control (User Service 2.1)

Surface Street Control (User Sub-Service 2.1.2)

This User Sub-Service provides the central control and monitoring equipment, communication links, and the signal control equipment that support local surface street control and/or arterial traffic management. A range of traffic signal control systems are represented by this User Sub-Service ranging from static pre-timed control systems to fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests. Additionally, general advisory and traffic control information can be provided to the driver while en-route. This User Sub-Service is generally an intra-jurisdictional sub-service that does not rely on real-time communications between separate control systems to achieve area-wide traffic signal co-ordination. Systems that achieve co-ordination across jurisdictions by using a common time base or other strategies that do not require real time co-ordination would be represented by this sub-service. This User Sub-Service is consistent with typical urban traffic signal control systems.

This User Sub-Service is related to the *Surface Street Control Market Package* within the ITS Architecture for Canada.

Traffic Information Dissemination (User Sub-Service 2.1.5)

This User Sub-Service allows traffic information to be disseminated to drivers and vehicles using roadway equipment such as dynamic message signs or highway advisory radio. This User Sub-Service provides a tool that can be used to notify drivers of incidents. Careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This User Sub-Service also covers the equipment and interfaces that provide traffic information from a traffic management centre to the media (e.g. via a direct tie-in between a traffic management centre and radio or television station computer systems), transit management centre, emergency management centre, and information service provider.

This User Sub-Service is related to the *Traffic Information Dissemination Market Package* within the ITS Architecture for Canada.

Incident Management (User Service 2.2)

2.2.1 Incident Management Coordination (User Sub-Service 2.2.1)

This User Sub-Service manages both scheduled and unscheduled incidents so that the impact to the transportation network and traveller safety is minimised. Requisite incident detection capabilities are included in the highway control User Sub-Service. The regional co-ordination with other traffic management (e.g. municipal and regional traffic and transit authorities, ferry operators, etc.), and emergency management centres, weather service entities, and event promoters is supported by this User Sub-Service. Information from these diverse sources are collected and correlated by this User Sub-Service to detect and verify incidents and implement an appropriate response. This User Sub-Service provides Traffic Management Subsystem and Maintenance Management Subsystem equipment that supports traffic operations/maintenance personnel in developing an appropriate response in co-ordination with emergency management and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications and dissemination of information to affected travellers using the Traffic Information Dissemination market package. The same equipment assists the operator by monitoring incident status as the response unfolds. The co-ordination with emergency management might be through a CAD system or through other communication with emergency field personnel. Co-ordination between traffic and maintenance operations is also included and also includes assets such as tow trucks.

This User Sub-Service is related to the *Incident Risk Prediction System Market Package* within the ITS Architecture for Canada.

Operations and Maintenance (User Service 2.5)

Smart Work Zone (User Sub-Service 2.5.2)

This User Sub-Service includes systems that gather, store, and disseminate information relating to work zones. The roadside elements of the User Sub-Service can monitor and control traffic in the vicinity of the work zone. The central element of this User Sub-Service can participate in incident management by initiating incident notification, or by participating in incident response. It can advise drivers of work zone status (either directly at the roadside or through an interface with the Information Service Provider or Traffic Management Subsystems.). The central systems can manage and track construction and maintenance activities while co-ordinating with other Subsystems (such as traffic management). It can schedule and manage the location and usage of maintenance assets (such as portable dynamic message signs). These information systems are used by roadway maintenance personnel, roadway construction personnel, and other work crew personnel assigned to highway construction and maintenance to rapidly correct deficiencies that are noted through its advanced surveillance capabilities. This improves the quality and accuracy of information available to Travellers regarding closures and other roadway construction and maintenance activities, and improves safety for workers within the work zone.

This User Sub-Service is related to the *Smart Work Zones Market Package* within the ITS Architecture for Canada.

Automated Dynamic Warning and Enforcement (User Service 2.6)

Dynamic Roadway Warning (User Sub-Service 2.6.1)

This User Sub-Service supports the dynamic presentation of warning information to drivers. Warnings may be generated in response to roadway weather conditions, road surface conditions, traffic conditions, obstacles or animals in the roadway, and any other transient events that can be sensed. Warnings may also be generated that recognise the limitations of a given vehicle for the geometry of the roadway, (e.g. rollover risk for tall vehicles). This User Sub-Service differs from "Traffic Information Dissemination" in that it is possible for all processing to occur remotely at the roadside, making this capability autonomous for remote application. It also expands the capabilities of Traffic Information Dissemination User Sub-Service by focusing on non-traffic roadway issues. This User Sub-Service would be of particular benefit to the rural areas of Atlantic Canada.

This User Sub-Service is related to the *Dynamic Roadway Warning Market Package* within the ITS Architecture for Canada.

Public Transport Management (User Service 3.1)

Transit Vehicle Tracking (User Sub-Service 3.1.1)

This User Sub-Service provides for an Automated Vehicle Location System to track the transit vehicle's real time schedule adherence and updates the transit system's schedule in real-time. Vehicle position may be determined either by the vehicle (e.g., through GPS) and relayed to the infrastructure or may be determined directly by the communications infrastructure. A 2-way wireless communication link with the Transit Management Subsystem is used for relaying vehicle position and control measures. Fixed route transit systems may also employ beacons along the route to enable position determination and facilitate communications with each vehicle at fixed intervals. The Transit Management Subsystem processes this information, updates the transit schedule and makes real-time schedule information available to the Information Service Provider Subsystem via a wireline link.

This User Sub-Service is related to the *Transit Vehicle Tracking Market Package* within the ITS Architecture for Canada.

Electronic Payment Services (User Service 4.1)

Electronic Toll Collection (User Sub-Service 4.1.1)

This User Sub-Service provides toll operators with the ability to locally or centrally collect tolls electronically and detect and process violators. Variations in the fees that are collected enable implementation of demand management strategies. Dedicated short-range communication between the roadway equipment and the vehicle is required as well as wireline interfaces between the toll collection equipment and transportation authorities and the financial infrastructure that supports fee collection. Vehicle tags of toll violators are read and electronically posted to vehicle owners. Standards, inter-agency co-ordination, and financial clearinghouse capabilities enable regional and ultimately national interoperability for these services. The population of toll tags and roadside readers that these systems utilize can also be used to collect road use statistics for highway authorities. This data can be collected as a natural by-product of the toll collection process or collected by separate readers that are dedicated to probe data collection.

This User Sub-Service is related to the *Electronic Toll Collection Market Package* within the ITS Architecture for Canada.

Traveller Services Payment (User Sub-Service 4.1.4)

This User Sub-Service enhances the Interactive Traveller Information User Sub-Service by making infrastructure-provided yellow pages and reservation services available to the user. The same basic user equipment is included. This User Sub-Service provides multiple ways to access information either while en-route using wide-area wireless communications or pre-trip via wireline connections.

This User Sub-Service is related to the *Traveller Services Payment and Reservation Market Package* within the ITS Architecture for Canada.

Commercial Vehicle Electronic Clearance (User Service 5.1)

Electronic Clearance (User Sub-Service 5.1.1)

This User Sub-Service will be of particular relevance to the main border crossing facilities within New Brunswick. It provides for automated clearance at roadside check facilities. The roadside check facility communicates with the Commercial Vehicle Administration Subsystem over wireline to retrieve infrastructure snapshots of critical carrier, vehicle, and driver data to be used to sort passing vehicles. This User Sub-Service allows a compliant driver/vehicle/carrier to pass roadside facilities at highway speeds using transponders and dedicated short-range communications to the roadside. The roadside check facility may be equipped with AVI, weighing sensors, transponder read/write devices, and computer workstation processing hardware, software, and databases.

This User Sub-Service is related to the *Electronic Clearance Market Package* within the ITS Architecture for Canada.

International Border Crossing Clearance (User Sub-Service 5.1.2)

Important for the Atlantic Provinces because of the numerous border facilities to the U.S., this User Sub-Service provides for automated clearance specific to international border crossings. This sub-service augments the electronic clearance sub-service by allowing interface with customs related functions and permitting NAFTA required entry and exit from Canada and the U.S.

This User Sub-Service is related to the *International Border Crossing Clearance Market Package* within the ITS Architecture for Canada.

Weigh-in-Motion (WIM) (User Sub-Service 5.1.3)

This User Sub-Service provides for high speed weigh-in-motion with or without AVI capabilities. If the equipment is fixed, then it is characterized as an addition to the electronic clearance and would work in conjunction with the AVI and AVC equipment in place.

This User Sub-Service is related to the *Weigh-In-Motion (WIM) Market Package* within the ITS Architecture for Canada.

Intermodal Freight Management (User Service 5.5)

Freight In-Transit Monitoring (User Sub-Service 5.5.1)

This User Sub-Service covers the ability to track and monitor intermodal containers and intermodal freight shipments anywhere in the transportation system. This information is provided to freight customers, fleet managers, and logistics service providers. This User Sub-Service supports the monitoring of the container and its contents during the entire pickup-transport-drop-off period.

This User Sub-Service is related to the *Freight In-Transit Monitoring Market Package* within the ITS Architecture for Canada.

Intermodal Interface Management (User Sub-Service 5.5.2)

This User Sub-Service supports the operation of the roadway aspects of an intermodal terminal. The "terminal" may represent the transfer point between roadway and one or more other modes of container transport (rail, air or water), and may be an actual terminal facility or a private intermodal transfer facility. The key capabilities include the ability to identify and control vehicle traffic entering and departing the facility, guide vehicles to loading and unloading points, maintain site security and monitor container integrity, provide an interface to Customs as appropriate, and acknowledge container pickup and drop-off. In addition, the sub-service allows data exchange between different terminals of the same mode or different modes. Other capabilities include the ability to track container locations within the facility and to manage any other required assets, like truck chassis. This User Sub-Service may be deployed in conjunction with user the Weigh-in-Motion and Roadside CVO Safety User Sub-Services to provide truck weight and safety assessments for vehicles prior to departing the facility.

This User Sub-Service is related to the *Freight Terminal Management Market Package* within the ITS Architecture for Canada.

Commercial Fleet Management (User Service 5.6)

Fleet Administration (User Sub-Service 5.6.1)

This User Sub-Service keeps track of vehicle location, itineraries, and fuel usage at the Fleet and Freight Management Subsystem using a cell based or satellite data link and the pre-existing wireless infrastructure. The vehicle has a processor to interface to its sensor (e.g., fuel gauge) and to the cellular data link. The Fleet and Freight Management Subsystem can provide the vehicle with dispatch instructions, and can process and respond to requests for assistance and general information from the vehicle via the cellular data link. The User Sub-Service also provides the Fleet Manager with connectivity to intermodal transportation providers using the existing wireline infrastructure.

This User Sub-Service is related to the *Fleet Administration Market Package* within the ITS Architecture for Canada.

Freight Administration (User Sub-Service 5.6.2)

This User Sub-Service tracks cargo and its status. This information is communicated with the Fleet and Freight Management Subsystem via the existing wireless infrastructure. Interconnections are provided to intermodal shippers and intermodal freight terminals for tracking the cargo from source to destination.

This User Sub-Service is related to the *Freight Administration Market Package* within the ITS Architecture for Canada.

CVO Fleet Maintenance (User Sub-Service 5.6.1)

This User Sub-Service supports maintenance of CVO fleet vehicles through close interface with on-board monitoring equipment and AVLS capabilities with in the Fleet and Freight Management Subsystem. Records of vehicle mileage, repairs, and safety violations are maintained to assure safe vehicles on the highway.

This User Sub-Service is related to the CVO Fleet Maintenance Market Package.

Emergency Notification and Personal Security (User Service 6.1)

Personal Security (User Sub-Service 6.1.1)

This User Sub-Service allows the user (driver, non-driver, and pedestrian) to initiate a request for emergency assistance and enables the Emergency Management Subsystem to locate the user and determine the appropriate response. The Emergency Management Subsystem may be operated by the public sector or by a private sector provider. The request from the traveller needing assistance may be manually initiated or automated and linked to vehicle sensors. The data is sent to the Emergency Management Subsystem using wide area wireless communications with voice as an option. Providing user location implies either a location technology within the user device or location determination within the communications infrastructure.

This User Sub-Service is related to the *Personal Security and MAYDAY Support Market Package* within the ITS Architecture for Canada.

MAYDAY Support (User Sub-Service 6.1.2)

This User Sub-Service allows the user (driver, non-driver, and pedestrian) to initiate a request for emergency assistance and enables the Emergency Management Subsystem to locate the user and determine the appropriate response. The Sub-Service allows user to inform regarding the stolen vehicles and enables the Emergency Management Subsystem to detect and stop such vehicles. The Emergency Management Subsystem may be operated by the public sector or by a private sector provider. The request from the traveller needing assistance may be manually initiated or automated and linked to vehicle sensors. The data is sent to the Emergency Management Subsystem using wide area wireless communications with voice as an option. Providing user location implies either a location technology within the user device or location determination within the communications infrastructure.

This User Sub-Service is related to the *Personal Security and MAYDAY Support Market* within the ITS Architecture for Canada. Package.

Disaster Response and Management (User Service 6.3)

Disaster Command and Control (User Sub-Service 6.3.1)

This User Sub-Service supports the co-ordinated response to large-scale disasters. Examples can include natural disasters like hurricanes, blizzards, earthquakes, and floods or man-made disasters like explosions, chemical spills, terrorism, or air crashes. The User Sub-Service supports co-ordination of the roadway transportation management centres with the overall command authority that is leading the disaster response. This includes co-ordination of emergency management and maintenance management fleets and activities, the use of transit assets to support evacuation and the exchange of information with traffic management to control roadway usage.

This User Sub-Service is related to the *Disaster Command and Control Market Package* within the ITS Architecture for Canada.

Disaster Information Dissemination (User Sub-Service 6.3.2)

This User Sub-Service supports the dissemination of disaster related information from a central co-ordinating point. Disasters are considered to be large-scale events that affect regions and may require province-level or even national-level response. The information that is disseminated can include evacuation guidance to travellers via traffic management and information service providers. Information can also include specific disaster response status for the operational needs of various transportation and emergency management agencies. This User Sub-Service also supports the capability for the disaster-co-ordinating agency to collect information from the transportation agencies, to help monitor the disaster and the status of the response.

This User Sub-Service is related to the *Disaster Information Dissemination Market Package* within the ITS Architecture for Canada.

Emergency Vehicle Management (User Service 6.4)

Emergency Response Management (User Sub-Service 6.4.1)

This User Sub-Service provides the computer-aided dispatch systems, emergency vehicle equipment, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Co-ordination between Emergency Management Subsystems supports emergency notification and co-ordinated response between agencies. Existing wide area wireless communications would be utilized between the Emergency Management Subsystem and an Emergency Vehicle to enable an incident command system to be established and supported at the emergency location. The Emergency Management Subsystem would include hardware and software for tracking the emergency vehicles. Public safety, traffic management, maintenance management and many other allied agencies may each participate in the co-ordinated response managed by this sub-service.

This User Sub-Service is related to the *Emergency Response Management Market Package* within the ITS Architecture for Canada.

Emergency Vehicle Routing (User Sub-Service 6.4.2)

This User Sub-Service supports dynamic routing of emergency vehicles and co-ordination with the Traffic Management Subsystem for special priority on the selected route(s). The Information Service Provider Subsystem supports routing for the emergency fleet based on real-time traffic conditions and the emergency routes assigned to other responding vehicles. In this User Sub-Service, the Information Service Provider Subsystem would typically be integrated with the Emergency Management Subsystem in a public safety communications centre. The Emergency Vehicle would also optionally be equipped with dedicated short-range communications for local signal pre-emption.

This User Sub-Service is related to the *Emergency Vehicle Routing Market Package* within the ITS Architecture for Canada.

Weather and Environmental Data Management (User Service 8.1)

Roadway and Weather Data Fusion (User Sub-Service 8.1.1)

This User Sub-Service supports the fusion of roadway environmental data with general weather forecasts and observations. Roadside sensor systems, or sensor systems mounted on maintenance vehicles collect roadway environmental data while the national meteorological service provides the basic weather data and modelling functions.

This User Sub-Service is related to the *Roadway and Weather Data Fusion Market Package* within the ITS Architecture for Canada.

Environmental Information Dissemination (User Sub-Service 8.1.2)

This User Sub-Service supports the dissemination of roadway and weather data to centres which can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travellers.

This User Sub-Service is related to the *Environmental Information Dissemination Market Package* within the ITS Architecture for Canada.

5. ITS DEPLOYMENT PROGRAM

The Deployment Program definition establishes the strategic projects for short, medium and long term deployment, the implementation schedule, and an Action Plan for ongoing monitoring through implementation and subsequent performance evaluation. The following is a summary of these aspects.

5.1 STRATEGIC PROJECTS

5.1.1 Development of Strategic Project Short-List

Drawing from the information gathered, the stakeholder input/discussions and the analysis undertaken in Tasks 1 through 4, a short list of strategic projects was developed and reflected:

- Identified "early winners";
- Additional priority projects that meet the needs and vision;
- Projects that may:
  - Expand the use of technology;
  - Receive positive reaction from all sectors and stimulate other projects in the Atlantic Region;
  - Involve Atlantic companies/services; and/or
  - Stimulate economic growth.

Initially the stakeholder group identified twenty-six strategic projects, which have been refined through the stakeholder consultation process outlined below.

5.1.2 Stakeholder Input

The stakeholder group was reconvened in Halifax on April 25th, 2002 and in St. John's on May 15th, 2002 to undertake a Deployment Planning workshop. A detailed agenda and list of participants is included in Appendix I. The workshops included a(n):

- Introductory session which provided an overview of the study status and prepared the participants to provide input on the deployment plan;
- Presentation of the "project profile" summaries for the short-list of strategic ITS projects; and
- Opportunity to provide input relating to the strategic projects and their characteristics.

Individuals directly related to the project and others in the area of expertise reviewed the strategic projects in detail. To facilitate the review process, one-page "project profiles" were prepared for each project.

As a result of the input received through these workshops, a number of changes were made to the project list and the content of individual profiles. Specifically, some of the traveller information and commercial vehicle projects were combined. In both these circumstances, all agreed that the nature, scope and intent of these projects were sufficient to warrant their combination.

In June 2002, the project profiles were revised to reflect the comments received by the stakeholder group and the Project Steering Committee (PSC). The updated project profiles were distributed by e-mail to the stakeholders present at the Deployment Planning workshops, the PSC and the ITS Working Group for a final review and comment. This series of reviews was undertaken to ensure that comments were received and incorporated as the participants and PSC envisioned.

Exhibit 5.1 is a summary of the final list of the twenty-two projects to be included in the Plan. Each project was given a reference number based upon their primary User Service.

Exhibit 5.1 – Final Project List

Project Reference	Project Name
TI-1	Atlantic Provinces Advanced Traveller and Tourist Information System
TM-1	Atlantic Provinces ARWIS Expansion
TM-2	Wildlife Detection in Atlantic Canada, Scoping Study and Pilot Project
TM-3	Implementation of Fixed Automated Spray Technology (FAST) for Bridge De-icing
TM-4	Red Light Camera Pilot Project
TM-5	Portable Changeable Message Sign (PCMS) for Work Zones
TM-6	Smart Snowplow Expansion
TM-7	Bridge Incident Management Scoping Study
PT-1	Urban Transit Real-Time Information Service
PT-2	Community Transit Fleet Management
EP-1	Parking Electronic Payment and Monitoring
EP-2	Atlantic Canada Transaction Tag
EP-3	Smart Card Pilot Project
CV-1	Integrated Intermodal Information System
CV-2	Atlantic Trade Corridor Border Security and Electronic Inspection
CV-3	Atlantic Canada Electronic Permitting for Oversized and Overweight Vehicles
CV-4	Port Operational Information Extranet
CV-5	Port Container Security

Exhibit 5.1 – Final Project List

Project Reference	Project Name
CV-6	Airport Groundside Transportation Management
CV-7	Commercial Fleet Management Program
EM-1	Wireless Network Expansion
EM-2	Atlantic Provinces Disaster Response Plan Scoping Study

Notes:
TI – Traveller Information
PT- Public Transport
CV- Commercial Vehicle
TM – Traffic Management
EP – Electronic Payment
EM – Emergency Management

5.1.3 Project Profiles

A one-page "project profile" was developed for each of the short-listed strategic projects to provide a brief summary of the details of the project. A summary template was developed to allow for easy consumption and review by the stakeholders and others by providing a common format and a consistent level of detail for all projects.

The project profile summaries include:

- **Project Title and Reference Number**
- **Project Description** – A brief description of the project highlighting the principle components and a direct reference to one or more needs from Task 1 that are being addressed by the initiative;
- **Benefits** – The nature of the anticipated benefits and the key beneficiaries;
- **Barriers** – Identification of any known barriers to implementation including organizational, financial, legal, user acceptance or technical impediments;
- **Project Logistics** – A description of the related ITS and other on-going projects external to the Plan, the technologies required to implement the initiative and the required resources (funding);
- **Participants** – Categorization of participants into lead and supporting participants as a function of there expected involvement in the project;
- **ITS Definitions** – Identification of the components of the ITS architecture that are applicable to the project, including User Services, User Sub-services and Market Packages;
- **Evaluation** – A description of the measures of effectiveness and the methodologies to evaluate the relative success of the project; and

- **Implementation Time Frame** – The implementation time frame including an estimation of the start date.

Project profiles for the finalized list of strategic projects are included in the following pages.

Project No. TI-1

Atlantic Provinces Advanced Traveller and Tourist Information System

PROPOSED PROJECT PROSPECTUS

Project Description

The first stage of the project would consist of a pilot system in New Brunswick, providing traveller information and tourist reservation systems. The project would incrementally be expanded to include other services and regions through the course of the project. The system would gather, fuse and disseminate traffic and weather data to provide travellers with information prior to their departure, and would assist them in making reservations at local facilities. A key to the delivery of comprehensive, consolidated, and accurate traveller information is the implementation of an information warehouse. The establishment of the data warehouse would be undertaken through cooperation with the remaining Atlantic Provinces.

Need #8: Improved ferry services, particularly Nova Scotia – Newfoundland
Need #9: Provide travel incentives and traveller information to promote tourism in Atlantic Canada

Benefits

- Travellers will be able to access one service to find information on traffic and weather conditions, construction sites and bridge closures
- The consolidation of the data will make gaps in data more apparent, and encourage system expansion.
- The project will include an information warehouse that will house data required to support and assess other initiatives.

Barriers

Organizational and Funding Issues:
- Inter-agency co-operation
- Identification of a host operator
- Funding structure and availability

Technical
- Geographic gaps in available data
- Lack of common data/information sharing structure, i.e. lack of national standards

Logistics

Directly Related Projects:
- EM-1 – Wireless Network Expansion
- EP-1 – Saint John Parking Commission Parking Electronic Payment/Monitoring
- CV-4 – Port of Halifax Operational Information Extranet
- CV-6 - Halifax Airport Groundside Transportation Management

Technologies:
- Traveller information website and other information dissemination services

Estimated Resources:
- Pilot project deployment and support ($400,000 to $700,000)
- Design and implementation of information warehouse ($500,000 to $700,000)

Participants

Lead Participants: New Brunswick Department of Transportation and New Brunswick Tourism.

Supporting Participants:

- Three remaining provincial departments and large municipalities
- Maine Department of Transportation and Transport Quebec
- Environment Canada and ACOA
- Canadian Customs and Revenue Agency and U.S. Customs
- Internet service providers, toll authorities and telecommunications services
- Nova Scotia Tourism

ITS Definition

User Service: 1.1 Traveller Information, 1.4 Traveller Services and Reservations, 8.1 Weather and Environmental Data Management, 8.2 Archived Data Management

User Sub-Services: 1.1.1, 1.4.1, 1.4.2, 8.1.1

Market Packages: AD1, AD2, AD3, ATISI, ATMS06, ATIS7

Evaluation

The primary evaluation criteria for the project would be the:

- Number of travellers using the system
- Growth in tourism industry participants in the system
- Stability of the system
- Interest in expansion generated by the pilot project.
- The information warehouse will be evaluated based on the quality and scope of the data

Target Start: Spring 2003					
2003	2004	2005	2006	2007	2008

Project No. TM-1

Atlantic Provinces ARWIS Expansion

PROPOSED PROJECT PROSPECTUS

Project Description

ARWIS technologies are currently being used to verify local weather conditions, forecast snow control planning and evaluate response actions, increase weather forecast accuracy, and provide traveler information. This initiative would review opportunities to improve ARWIS coverage throughout the Atlantic Provinces, improve information exchange to Environment Canada and provide road weather information to road maintenance personnel.

Need #2: Reduce rural road accidents through early detection and treatment of adverse conditions
Need #5: Improved effectiveness and efficiency of roadway winter maintenance operations

Benefits

This project would contribute to improvement in road conditions during and after winter storm events along with a reduction in roadway collisions and liability exposure. Further improvements in the effectiveness and efficiency of roadway winter maintenance operations should also be realized. ARWIS would help justify and document the use of road salt in support of Environment Canada's initiatives relating to salt being declared as harmful to the environment.

Barriers

Both Federal and Provincial governments would have to provide capital and on going operational funding. Municipal and private groups would also be looked to for operational funding. Inter-agency and Public/Private partnerships would have to be forged. Local expertise in ARWIS planning, installation and maintenance would have to be developed. The expanded system would have to be integrated with multiple existing ARWIS systems.

Liability issues relating to data dissemination.

Logistics

Directly Related Projects:
- Need commitment from Environment Canada for ongoing ARWIS polling, forecasting and Web Server operation.
- Planning on a regional (Atlantic) scale to achieve good coverage and integration of new with existing sites without overlap.
- TM-6 – Smart Snowplow Expansion

Technologies:
- ARWIS site equipment compatible with existing information dissemination system

Estimated Resources:
- 5 sites - $400,000 and 10 sites - $750,000

Participants

Environment Canada Environnement Canada

Lead Participants: The four Provincial DOTs providing the ARWIS sites and Environment Canada.

Supporting Participants:
- Municipalities
- Private road agencies
- Winter maintenance contractors
- ARWIS suppliers
- Information service providers
- Trucking industry

ITS Definition

User Services: 2.4 Environmental Conditions Management.
User Sub-services: 2.4.1 Roadway Environmental Sensing; 2.4.3 Road Weather Information System
Market Package(s): ATMS18 Road Weather Information System, ATMS20 Roadway Environmental Sensing

Evaluation

Agencies should monitor before/after collision data and maintenance expenditures. The Atlantic Provinces can expect to see:
- An improvement in highway safety through a reduction in roadway collisions and liability exposure;
- Further improvements in the effectiveness and efficiency of roadway winter maintenance operations;
- Improved justification and documentation of Road Salt use (supporting Environment Canada's initiatives relating to Salt being declared as harmful to the environment).

Target Start: Summer 2004

2003	2004	2005	2006	2007	2008

Project No. TM-2

Wildlife Detection in Atlantic Canada Scoping Study and Pilot Project

PROPOSED PROJECT PROSPECTUS

Project Description

This two-phase project would commence with a scoping study to assess potential collision reduction methods/technologies and identify high wildlife conflict sections of roadway. This exercise would be followed by a pilot installation on high risk rural section of roadway including an assessment of the effectiveness of the chosen system in reducing collisions. Further applications in other Atlantic Provinces would be a follow-on project.

Need #3: Reduce the incidence, severity, and cost to the community of road collisions.

Benefits

The average vehicle damage costs resulting from deer-vehicle collisions is $2,000, with moose-vehicle collisions far exceeding this value. Annually, there are approximately 250 moose-vehicle collisions in New Brunswick. In addition to the property damage, costs associated with personal injury, collision investigation and removal of dead or maimed animals may result.

Technologies are available which have the potential to reduce the frequency and/or severity of deer/moose-vehicle collisions, thus improving highway safety.

Logistics

Directly Related Projects:
- None

Technologies:
- Infra-red or microwave detection
- Audible warning and/or active warning signs
- Communications infrastructure

Estimated Resources:
- First stage - determination of the best available technology and suitable high risk sites ($20,000 to $30,000)
- The pilot project will include construction, maintenance and monitoring of the system on three two-kilometre road sections. In addition, an evaluation of the collision reduction will be undertaken. ($70,000 – $90,000 based on other agency costs)

ITS Definition

User Service: 2.6 Automatic Dynamic Warning and Enforcement
Sub-Service: 2.6.1 Dynamic Roadway Warning
Market Packages: ATMS26 Dynamic Roadway Warning

Target Start: Spring 2003

2003	2004	2005	2006	2007	2008

Barriers

- Collision data availability for the identification of suitable pilot test sites
- Lack of power and communication infrastructure in some remote areas
- Public education regarding the system to ensure user acceptance
- An extended data collection period would be required to ensure statistical validity and to test for behavioural adaptation of the deer/moose

Participants

Lead Participants: New Brunswick Department of Transportation and New Brunswick Natural Resources and Energy.

Supporting Participants:
- University of New Brunswick through "in-kind" research and analysis services in both Phases of the study
- New Brunswick Department of Public Safety
- Co-operation with police services will be an important component of the study
- Maritime Roads Development Corporation
- Other Atlantic Provinces

Evaluation

The primary criteria for the project would be the:

- Reduction in deer/moose-vehicle collisions
- Public perception regarding reliability and usefulness of system
- Cost-benefit analysis of pilot test technology versus "do nothing" and other conventional methods such as fencing

Project No. TM-3

Implementation of Fixed Automated Spray Technology (FAST) for Bridge De-icing

PROPOSED PROJECT PROSPECTUS

Project Description

This project would see the installation of a Fixed Automated Spray Technology (FAST) system on the existing A. Murray MacKay Bridge (Hwy. 111) between Halifax and Dartmouth in Nova Scotia. The operation of the system would be coordinated with existing winter maintenance agencies to improve the conditions on the bridge during and after winter storm events. The project would make use of non-chloride spray chemicals to reduce corrosion and chloride loading in the surrounding environment.

Need #5: Improved effectiveness and efficiency of roadway winter maintenance operations

Benefits

This project would contribute improvement in bridge conditions during and after winter storm events along with a reduction in roadway collisions and liability exposure. Improvements in the effectiveness and efficiency of the winter maintenance operations on the bridge should also be realized. FAST would also reduce corrosion and chloride loading in the surrounding environment including the structure.

Barriers

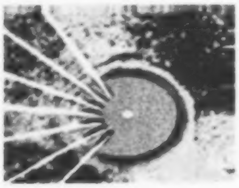
This project faces a number of challenges including capital and on-going operational funding. Local expertise in FAST design, installation and maintenance would have to be developed.

Logistics

Directly Related Projects:
- None

Technologies:
- Automated detection and spray systems

Estimated Resources:
- $1,000,000 - $1,250,000



Participants

Lead Participant: Halifax-Dartmouth Bridge Commission

Supporting Participants:
- Halifax Regional Municipality
- Suppliers of FAST equipment and chemicals
- Local winter maintenance contractors and agencies

ITS Definition

User Services: 2.4 Environmental Conditions Management
Sub-services: 2.4.1 Roadway Environmental Sensing
Market Package(s): ATMS20 Roadway Environmental Sensing

Evaluation

This single site FAST pilot project would be evaluated in three areas:

- Reduction in roadway collisions and liability exposure
- Improvements in the effectiveness and efficiency of the winter maintenance operations on the bridge
- Reduction in bridge corrosion and chloride loading in the surrounding environment

Target Start: Summer 2003					
2003	2004	2005	2006	2007	2008

Project No. TM-4

Red Light Camera Pilot Project

PROPOSED PROJECT PROSPECTUS

Project Description

The objective of this pilot project is to implement Red Light Cameras (RLC) at study locations and evaluate the effectiveness of the cameras in terms of reducing the occurrence of red light running. The City of St. John's is identified as the prospective showcase deployment for this technology. The purpose of the evaluation is to add to the body of data currently available on this topic, and determine whether further deployment is warranted within the Atlantic Provinces.

Need #3: Reduce the incidence, severity and cost to the community of road collisions

Benefits

- Several jurisdictions have reported that RLC reduce the occurrence of red light running, and hence the potential for collisions
- RLC provide an automated enforcement tool that provides "around-the-clock" enforcement
- Potentially self-funding
- Societal benefits to insurance claims, health care, emergency services, etc.

Barriers

Legal:
- Revisions to existing legislation, or additional legislation may be required to use RLC for enforcement purposes

User Acceptance:
- Public perception and acceptance of automated enforcement systems to date has been mixed

Logistics

Directly Related Projects:
- Develop and enact legislation for RLC enforcement

Technologies
- Off-the-shelf RLC (wet film for prosecution purposes)
- Vehicle detectors – typically inductive loops

Estimated Resources:
- Approximately $100,000 per site for camera and installation
- Ongoing costs to maintain equipment retrieve and process film, generate offense notices and prosecute offences
- Alternate business model is to lease equipment from vendors

Participants

Lead Participant: City of St. John's Transportation

Support Participants:
- Provincial government level to enact legislation for RLC enforcement
- Police services

ITS Definition

User Services: 2.6 Automated Dynamic Warning and Enforcement
User Sub-Services: 2.6.3 Signal Enforcement
Market Packages: ATMS28 Signal Enforcement

Evaluation

The main emphasis of the evaluation is to determine the effectiveness of RLC. Measuring the effectiveness of RLC may consider:
- A comparison in the occurrence of red light running before and after the cameras were implemented (i.e. reduction in potential for collisions)
- A comparison of the performance (in terms of cost and effectiveness) of RLC versus traditional police enforcement techniques

Target Start: Spring 2003

2003	2004	2005	2006	2007	2008

Project No. TM-5

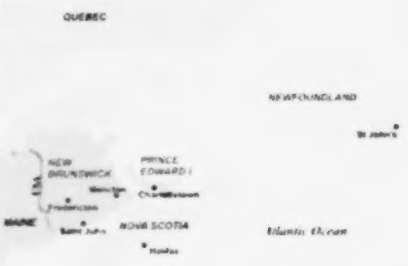
Portable Changeable Message Sign (PCMS) for Work Zones

PROPOSED PROJECT PROSPECTUS

Project Description

This project involves the installation of PCMS for a large-scale construction project to test their ability to aid the traveling public, and enhance safety to the traveling public and field personnel. Ideally, the construction project would have a series of stages, requiring several lane closure strategies. The various lane closures would provide a comprehensive assessment of the effectiveness of PCMS.

Need #4: Improved safety in road work zones



Benefits

- Increased safety for traveling public and construction personnel is the primary benefit of these systems
- Reduce work zone congestion by providing updated information to the traveling public
- Improve public's perception of work zone management

Barriers

The effectiveness of the PCMS would be governed, largely by the Contractor's ability to use the PCMS (i.e. implement the appropriate message for the roadway conditions). Detailed training is required to ensure the Contractor is knowledgeable on the use of the PCMS. Throughout the project, the Province of New Brunswick would need to closely monitor the use of the PCMS to ensure its correct operation. Funding availability may also be a barrier.

Logistics

Directly Related Projects:

- None

Technology

- Typically trailer mounted full matrix LED PCMS

Estimated Resources:

- Approximate $45,000 to $55,000 per sign.
- Four to eight PCMS units would be required for a large scale construction project.

Participants

Lead Participant: The New Brunswick Department of Transportation will lead the implementation of this project in conjunction with the University of New Brunswick and Maritime Road Development Corporation (MRDC).

Supporting Participants:

- Police Services will be required to evaluate the use of the PCMS
- Contractor responsible for the construction project is required to ensure the correct use of the PCMS

ITS Definition

User Services: 1.1 Traveller Information, 2.5 Operations and Maintenance, 2.6 Automated Dynamic Warning and Enforcement
User Sub-Services: 1.1.1 Broadcast Traveller Information, 2.5.2 Smart Work Zones, 2.6.1 Dynamic Roadway Warning
Market Packages: ATIS1 Broadcast Traveller Information, ATMS25 Smart Work Zones, ATMS26 Dynamic Roadway Warning

Evaluation

Aspects of the evaluation may include:

- Reduction in vehicle speeds through the work zone
- Survey of motorists to determine driver satisfaction
- Ease of PCMS use from the contractors perspective

Results of the evaluation would lead to the development of standards for using PCMS in work zones.

Target Start: Summer 2003

2003	2004	2005	2006	2007	2008

Project No. TM-6

Smart Snowplow Expansion

PROPOSED PROJECT PROSPECTUS

Project Description

This project expands on already operating services in the Atlantic Region on the Fredericton-Moncton Highway, in the Halifax Regional Municipality and other municipalities. The relevant aspect is in making efficient use of available funding required for winter road maintenance. Expansion would be well suited to a snowplowing operation in the vicinity of other smart snowplows to ease requirements for maintenance staff supporting the new technologies.

Need #2: Reducing rural road accidents through early detection of adverse conditions
Need #5: Enhance management of winter maintenance operations

Benefits

The use of smart salt application results in:

- Increased road safety
- Reduced winter maintenance cost
- Reduced impact to environment by better regulating salt usage
- Quicker response times to changing weather conditions or fleet problems
- Resulted in reductions of salt use by 10-30%

Other benefits relate to legal claims/liability associated with collision claims.

Barriers

Recent use of this technology should reflect significant benefits however issues may include:

- Funding that will be additional to current road maintenance needs
- Require training for maintenance of on-board equipment
- Require operational guidelines

Logistics

Directly Related Projects::

- TM-1 – Atlantic Provinces ARWIS Expansion

Technologies:

- Infrared sensors on snowplows
- Communications between trucks and operations center / AVL
- Mobile computers for salt spreading
- Sensors (speed, air & pavement temp.)

Estimated Resources::

- District cost is vehicle equipment ($15,000 per 140 lane kilometers) + control center equipment ($25,000) and GIS mapping

Participants

Lead Participant: Halifax Regional Municipality

Supporting Participants:

- Nova Scotia Department of Transportation and Public Works
- New Brunswick Department of Transportation
- City of St. John's Transportation
- Newfoundland Works, Services and Transportation

ITS Definition

User Service: 2.4 Environmental Conditions Management
Sub-services: Vehicle Based Sensing
Market Package(s): ATMS18 Road Weather Information System, ATMS20 Roadway Environmental Sensing, ATMS22 Environmental information Dissemination

Evaluation

The expanded use of technology to reduce rural accidents could be evaluated through:

- Review of collision rates
- Review of salt usage

Target Start: Spring 2003

2003	2004	2005	2006	2007	2008

Project No. TM-7

Bridge Incident Management Scoping Study

PROPOSED PROJECT PROSPECTUS

Project Description

With over 90,000 vehicle trips per day, the safe and efficient movement of traffic on the Macdonald and MacKay bridges must be maintained. Reducing the time to detect, assess and respond to unplanned events on the bridges would greatly improve the emergency response time and the time required to clear the incident.

A scoping study to determine costs and benefits of providing video (CCTV) coverage, variable message signs (VMS) on the approaches, and non-intrusive detection and motorist/bicycle call boxes at key locations along on the bridges.

Need #3 – Reduce the incidence, severity and cost to community of road collisions
Need #11 – Enhance ability to detect, verify and respond to incidents on major roadways

Benefits

The system would provide faster response to incidents, allowing appropriate resources to be directed to the scene. This ability has the potential to:

- Ensure effective use of emergency services
- Reduce driver and goods movement delay
- Reduce driver frustration and vehicle emissions

Barriers

- It is a challenge to quantify measures of effectiveness relating to non-recurrent congestion and unplanned incidents
- The project would require substantial input and support from participating agencies
- Estimation of the benefits would require the application of time saving approximations from other transportation systems

Logistics

Directly Related Projects:
- None

Technologies:
- Communications backbone, Variable message signs (VMS), CCTV

Estimated Resources:
- Identification of camera, detection, communication and video display hardware, operations and maintenance, and staff requirements ($50,000)
- Benefits will be determined by estimating existing frequency and nature of incidents, societal impact of incidents on the bridges and potential benefits of system ($30,000)

Participants

Lead Participants: Halifax-Dartmouth Bridge Commission

Supporting Participants:
- Halifax Regional Municipality
- Emergency service providers
- Nova Scotia Department of Transportation and Public Works

ITS Definition

User Service: 2.2 Incident Management
User Sub-Service: 2.2.1 Incident Management Coordination
Market Package: ATMS01 Traffic Network Flow Monitoring

Evaluation

The evaluation would include a benefit-cost analysis of the system implementation and operations versus its anticipated benefits. An analysis period of 15 to 20 years would be used and reflects the functional life of the primary components

The benefits of the system would be estimated values based on a comparison of existing incident techniques and benefits realized from systems in other jurisdictions

Target Start: Spring 2003

2003	**2004**	**2005**	**2006**	**2007**	**2008**

Project No. PT-1

Urban Transit Real-Time Information Service

PROPOSED PROJECT PROSPECTUS

Project Description

The use of new technology in public transit continues to increase attractiveness of transit in urban areas. This project will build on the existing Halifax Transit Automatic Vehicle Location (AVL) system, by adding a real-time information service for transit patrons. The service could be provided in cooperation with existing broadcast media traveller information services.

Need #13: Real time transit service monitoring and public information.

Benefits

The main benefit to implementing a real-time information service is increasing customer satisfaction, which in turn should increase ridership.

Barriers

- Integrating the real-time information system with the existing AVL system is the foremost barrier to deployment for this project
- Other barriers include map integration and funding

Logistics

Directly Related Projects:
- None

Technologies
- A variety of delivery mechanisms for providing real-time traveller information may be used (i.e. kiosks, Internet, phone, etc.)

Estimated Resources:
- $250,000 for enhanced customer contact services
- $250,000 to $500,000 for initial deployment of kiosks/passenger information displays

ITS Definition

User Services: 1.1 Traveller Information, 3.1 Public Transport Management
User Sub-Services: 1.1.3 Real Time Ride Sharing Information, 3.1.1 Transit Vehicle Tracking
Market Packages: ATIS8 Ride Matching, APTS1 Transit Vehicle Tracking

Participants

Lead Participant: Halifax Transit

Supporting Participants:
- Other transit agencies that have implemented real-time information services

Evaluation

Conduct a survey to assess patron satisfaction with the real-time information service, and assess users perception of system performance. Survey results should be cross-referenced with actual system performance to emphasis areas for operational improvements.

Target Start: Spring 2004

2003	2004	2005	2006	2007	2008

Project No. PT-2

Community Transit Fleet Management

PROPOSED PROJECT PROSPECTUS

Project Description

In Prince Edward Island, there is a need to co-ordinate local transit, inter-city, and inter-provincial transit operations. The purpose of this project would be to determine how ITS can assist in the integration and management of public and private bussing operations. The project could ultimately include the use of an integrated transit vehicle scheduling and tracking system. A first task would be a feasibility study to determine the scope of an integrated service, and the tools to be implemented. The second step would be to implement the integrated service.

Need #13: Real time transit service monitoring and public information
Need #14: Improve management of fleet transportation services

Benefits

An integrated system would lead to an expanded, more efficient local, inter-city, and inter-provincial transit operations. It would be of particular benefit to transit-captive transit patrons. Other benefits relate to security/safety of operators/users and reduced emissions through increased ridership.

Barriers

Organizational Issues:
- Ability of public sector to form partnership with private sector operators – competing objectives.

Technical:
- Compatibility of vehicles to serve a variety of uses

Logistics

Directly Related Projects:
- None

Technologies:
- Fleet GPS and an integrated web-based service request system

Estimated Resources:
- $80,000 including the development of a business model. Implementation costs will be determined through the development of the business case

Participants

Lead Participant: PEI Department of Transportation and Public Works

Supporting Participants:
- Municipalities
- School boards
- Trius tours
- Taxi services, shuttle buses and other private carriers

ITS Definition

User Service: 3.1 Public Transport Management, 3.3 Demand Responsive Management
User Sub-Services: 3.1.1 Transit Vehicle Tracking, 3.3.1 Demand Responsible Transit
Market Packages: APTS1 Transit Vehicle Tracking, APTS3 Demand Responsive Transit

Evaluation

The primary criteria for the project would be the:

- Increase in transit ridership
- Greater efficiency in fleet management

Target Start: Summer 2003

2003	2004	2005	2006	2007	2008

Project No. EP-1

Parking Electronic Payment and Monitoring

PROPOSED PROJECT PROSPECTUS

Project Description

This project would see the implementation of a pre-paid toll collection card/tag systems at the Saint John's primary parking facilities and the creation of a "back office" to administer the accounting and monitoring activities.

The Saint John Parking Commission currently operates 750 on-street parking spaces and off-street facilities totaling 3,600 parking spaces. Current payment methods include cash, credit card and tokens.

Need #15: Real-time management of parking operations

Benefits

- Reduce token collection and distribution activities/resources
- Reduces congestion and safety issues at entrances to parking facilities
- Permit detailed monitoring of parking occupancy.
- Ability to be expanded into other applications/services

Barriers

- Significant upfront costs are associated with implementation of the new system and the associated public education and awareness programs
- Compatibility with and expandability to other systems in the City and Region; standards are still evolving
- Maintaining ability to use tokens during the transition period would require multiple payment platforms during this time

Logistics

Directly Related Projects:
TI-1 – Atlantic Provinces Advanced Traveller and Tourist Information System

Technologies:

- Transaction tags/transponders
- Short-range communications to local facilities
- Information dissemination equipment
- Back office equipment

Estimated Resources:

- Assess available technologies including other systems that are currently used in the City/Region and establish a preferred system/vendor ($20,000)
- Determine which facilities should be equipped with payment and monitoring system ($30,000)
- Implement system – a follow-up stage once the feasibility has been resolved

Participants

Lead Participant - Saint John Parking Authority

Supporting participants:

- Retail operators and other public and private sector partners considering electronic payment opportunities

Evaluation

Evaluation measures should include:

- Entry/exit times at parking facilities
- Staff requirements to process payments
- Proliferation of use

In addition, a user survey could be undertaken to determine the qualitative benefits relating to convenience of the electronic payment.

ITS Definition

User Service: 4.1 Electronic Payment
Sub-Services: 4.1.2 Electronic Parking Payment
Market Packages: ATMS16 Electronic Parking Payment and Parking Facility Management

Target Start: Summer 2004

2003	2004	2005	2006	2007	2008

Project No. EP-2

Atlantic Canada Transaction Tag

PROPOSED PROJECT PROSPECTUS

Project Description

The first stage of the project would be to expand the tag population by inviting other partners/applications, such as tolls, parking, ferry service, and retail services.

The second stage would be to review opportunities to integrate back office functions.

Need #8: Improve ferry services
Need #15: Real-time management of parking operations

Benefits

- Operators share costs of "back office" transaction management
- Customers (commercial vehicle and private vehicle operators) only need to carry one electronic tag

Barriers

Organizational Issues:
- Identification of which agency would host the back office

Technical Issues:
- Interoperability and security of systems
- Confidence in system by retailers and customers
- Potential for future initiatives by financial institution to make system redundant by creating a new/more wide spread technology or application

Logistics

Directly Related Project:
- None

Technologies:
- Transaction tags/transponders
- Short-range communications to local facilities
- Information dissemination equipment
- Back office equipment

Estimated Resources:
- TBD

Participants

Lead Participants: Saint John Harbour Bridge, Confederation Bridge and Halifax-Dartmouth Bridge Commission

Supporting Participants:
- Highway 104 Corporation
- Financial institutions
- Ferry operators
- Retail operators and parking garages

ITS Definition

User Service: 4.1 Electronic Payment Services
Sub-Services: 4.1.1 Electronic Toll Collection, 4.1.2 Electronic Parking Payment, 4.1.4 Traveller Services Payment
Market Packages: ATMS10 Electronic Toll Collection, ATMS16 Electronic Parking Payment

Evaluation

The primary criteria for the project would be the:

- Establishment of a common back office
- Lower operating costs through the common back office
- Growth in transaction tag usage

Target Start: Spring 2003

2003	2004	2005	2006	2007	2008

Project No. EP-3

Smart Card Pilot Project

PROPOSED PROJECT PROSPECTUS

Project Description

The objective of this project is to deploy within St. John's, a multi-application smart card for use by Metrobus, City of St. John's, Memorial University, Aliant, colleges, high schools, banks and potentially other businesses and agencies. This project would involve three steps:

- An initial evaluation to identify public agencies for project participation, and an assessment of smart card technologies, particularly the City's Parkcard
- Deployment – procurement and installation of equipment and distribution of smart cards
- Project evaluation and potential expansion to other public agencies

Need #14: Improve management of fleet transportation services

Benefits

The following are the main advantages of smart cards over debit, credit cards, and cash:

- Improve user satisfaction through high speed transactions
- Reduction in operating costs
- Card holder privacy
- Capacity to store data

Barriers

Organizational issues:

- Back office/reconciliation issues
- Institutional challenges between agencies
- Concerns about privacy and security

Technical:

- Status of standards for technology
- Lack of physical infrastructure to support smart card system

Project Finance

- Uncertainty about the business case of introducing a smart card system

Logistics

Directly Related Projects:

- None

Technologies:

- Multi-application smart card

Estimated Resources:

- Varies depending on number of agencies involved, customer base, cost to customer for smart card, etc.

Participants

Lead Participants – Metrobus and City of St. John's Transportation

Supporting Participants:

- Memorial University
- Telecommunications services (Aliant, Rogers and AT&T)
- Other additional public and private agencies within St. John's

ITS Definition

User Services: 3.1 Public Transport Management, 4.1 Electronic Payment
User Sub-Services: 3.1.3 Passenger and Fare Management, 4.1.3 Transit Services Payment
Market Packages: APTS6 Transit Maintenance, APTS4 Passenger and Fare Management

Evaluation

Following the smart card implementation, a survey of customers would be conducted to assess the user-acceptance of the smart card. Smart card expansion to other public agencies would be contingent upon factors such as successful customer uptake of smart cards, reduction in operating costs and resolution of financial transaction security issues.

Target Start: Spring 2003

2003	2004	2005	2006	2007	2008

Project No. CV-1

Integrated Intermodal Information System

PROPOSED PROJECT PROSPECTUS

Project Description

This pilot project provides pre-clearance to commercial vehicles throughout the Province, which translates into eliminating stops for those vehicles.

The location for the weigh-in-motion (WIM) device would be at the Oceanex terminal in the Port of St. John's.

No WIM technologies are in use in Newfoundland and this new feature would improve operations at this world-class container depot. Project could be expanded to other key locations such as Port-aux-Basques.

Need #6: Expedited weight, credential and safety checks for commercial vehicles

Benefits

The pilot project would permit:
- Higher-speed truck passes
- Reduced queuing and delays
- Efficient weighing of vehicles
- Improved extent of information gathering

Other benefits include:
- Time savings/increased capacity
- Environmental benefits

Barriers

The primary barriers include:
- Availability of funding
- Determining the method of operation
- Protecting privacy of commercial information
- Integrating with technologies currently in use
- Coordination of stakeholders

Logistics

Directly Related Projects:
- None

Technologies:
- Pressure sensors (3 options)
- Transponders/roadside readers
- Communications

Estimated Resources:
- $15-80,000 per station (varies by option)
- Annual life cycle cost <$15,000 per station
- Enforcement staff at weigh station

Participants

Lead participants: Province of Newfoundland and Labrador Government Services and Lands, Motor Registration Division.

Supporting Participants:
- St. John's Port Authority
- Oceanex (shipping company) and trucking companies

ITS Definition

User Service: 5.1 Commercial Vehicle Electronic Clearance

Sub-services: 5.1.1 Electronic Clearance, 5.1.3 Weigh-in-Motion.

Market Package(s): CVO3 Electronic Clearance, CVO6 Weigh-in-Motion, CVO11 Freight In-Transit Monitoring

Evaluation

The pilot project is expected to result in efficiencies in the vehicle monitoring process, with peripheral effects such as less delays, less queuing, less wear on weigh station equipment. Evaluation should measure:
- Estimated saved time
- Willingness to pay for bypassing

A survey of users would provide useful input in terms of operational usefulness. An example is http://www.itsdocs.fhwa.dot.gov/jpodocs/repts_te/56701!.pdf

Target Start: Summer 2003

2003	2004	2005	2006	2007	2008

Project No. CV-2

Atlantic Trade Corridor Border Security and Electronic Inspection

PROPOSED PROJECT PROSPECTUS

Project Description

This initiative acts upon bilateral declarations aimed at improving the movement of goods between the Atlantic Provinces and the Northeastern US. Projects address resolutions put forth under the Smart Border Declaration of December, 2001 and declarations resulting from the August 2002 Conference of New England Governors and Eastern Canadian Premiers as follows:

- Resolution 27-1, Concerning the Standing Committee on Trade and Globalization
- Resolution 27-9, Concerning Security and Trade Between Canada and the United States

Projects build upon existing initiatives including Operation Safe Commerce, various I-95 Corridor Projects, and Customs programs including the Free and Secure Trade (FAST) program, and the NEXUS frequent traveller pre-clearance program. Key components of the Atlantic Trade Corridor initiative include:

- Preferred carrier programs employing electronic clearance for commercial vehicles at inspection stations and borders
- Application of advanced security screening technologies at borders
- Frequent traveller pre-clearance program to improve access at crossings, such as Campobello Island to the mainland

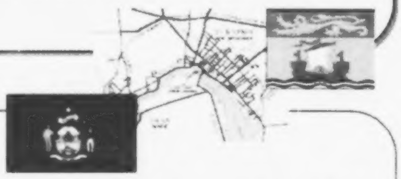
Need #1: Expedited border crossing inspection and clearance for commercial vehicles
Need #6: Expedited weight, credential, and safety checks for commercial vehicles

Benefits

- Easy access to motor carrier's safety and risk ratings, roadside inspection history and collision records improving enforcement efficiency and reduced wait times
- Quick access to electronic safety information required by insurers and shippers
- Compliance means reduced carrier down-time
- Improved surveillance of border crossing area and ability to utilize portable x-ray technologies to scan suspicious vehicles at customs/in the queue

Barriers

- Motor carrier participation / enrolment
- Funding
- Lack of existing infrastructure (e.g. pre-clearance at weigh stations)
- Legislation
- Lack of Canadian standardization for electronic collection and information transfer
- Cooperation of US and Canadian governments and custom agencies



Logistics

Directly Related Projects:

- St. Stephen - Calais new crossing development
- Technical Feasibility for CVO Network In Canada by Transport Canada (completion by Winter 2002)
- Benefit / Cost Study for Electronic Clearance and Roadside Inspection (ECRI) for Canada by Transport Canada (Fall 2002)
- CV-5 – Port of Halifax Container Security

Technologies:

- Wayside to Vehicle communications (e.g. transponders, tag readers, DSRC)
- Weigh-In-Motion, CCTV and vehicle detection
- Electronic security screening technologies

Estimated Resources:

- $850,000 per station
- $2.1 million for border crossing and security measures

Participants

Lead Participants: New Brunswick Departments of Transportation and Public Safety, US Customs, Canadian Customs and Revenue Agency

Supporting Participants:

- Federal and provincial governments, State of Maine, enforcement agencies and Transport Canada
- Commercial vehicle carriers and shippers
- ACOA
- Council of Atlantic Premiers
- Other Provincial Authorities as system expands
- I-95 Corridor Coalition

ITS Definition

User Services: 5.1 Commercial Vehicle Electronic Clearance
Sub-services: 5.1.1 Electronic Clearance, 5.1.2 International Border Crossing Clearance
Market Package(s): CVO3 Electronic Clearance

Evaluation

This pilot project would have the following evaluation parameters:

- Efficiency benefit (as measured in terms of % travel delay reduction)
- Safety benefit (as measured in terms of % accident reduction)
- Productivity benefit (as measured in terms of % cost reduction)
- Carrier satisfaction
- Evaluation of this pilot project would consist of the level of security obtained by the service provided and recommendations for improvements

Target Start: Spring 2003

2003	2004	2005	2006	2007	2008

ATLANTIC PROVINCES

Project No. CV-3

Atlantic Canada Electronic Permitting for Oversized and Overweight Vehicles

PROPOSED PROJECT PROSPECTUS

Project Description

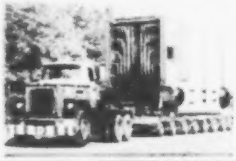
Electronic permitting of Oversized and Overweight Commercial Vehicles would reduce congestion and air pollution by providing fast and accurate route and clearance checking and any bridge analysis approvals. Use of non-permitted oversized / overweight vehicles would lead to asset (roads/bridges) damages.

This initiative is identified under the Atlantic Provinces Harmonized Trucking Strategy. Expansion to all the Atlantic Provinces would follow a pilot project in New Brunswick.

Need #6: Expedited weight, credential and safety checks for commercial vehicles

Benefits

The electronic permitting would allow Atlantic transportation authorities' personnel to issue permits based on bridge ratings, vertical clearances, congestion, and construction work zones.



Barriers

This project would require comprehensive planning to resolve issues such as developing a new common process of issuing permits that coordinates with the Atlantic transportation authorities, police, trucking companies.

Logistics

Directly Related Projects:
- Harmonized Trucking Strategy

Technologies:
- Standard for electronic data interchange and automated vehicle identification
- Cell phone / 2-way radio
- On-board highway patrol vehicle computers

Estimated Resources:
- Cost of $300,000 to $500,000

Participants

New Nouveau Brunswick

Lead participant: New Brunswick Department of Transportation

Supporting Participants:
- Other Atlantic Provinces Departments of Transportation, Public Safety, and Government Services and Lands
- Service New Brunswick
- RCMP
- Technology manufacturers
- Transmission services (on behalf of motor carriers)
- Commercial vehicle carriers and shippers.
- Industry Canada and ACOA

ITS Definition

User Service: 5.1 Commercial Vehicle Electronic Clearance
Sub-services: 5.1.1 Electronic Clearance
Market Package(s): CVO03 Electronic Clearance

Evaluation

This project should generate efficiencies in the permit issuance process, making freight activity more efficient and reducing related congestion and energy consumption. Evaluation should measure:
- Time savings
- Related reductions in energy use
- Improvements to staff efficiency

Target Start: Spring 2003

2003	2004	2005	2006	2007	2008

Project No. CV-4

Port Operational Information Extranet

PROPOSED PROJECT PROSPECTUS

Project Description

Provide a single point of contact to facilitate the collection and exchange of operational information pertinent to the efficient movement of goods through the Port of Halifax.

Need #12 – Enhanced tracking and real-time management of containers and other goods at intermodal terminals
Need #14 – Improved management of fleet transportation services

Benefits

- Mitigate congestion/delays for motor carriers accessing the Port
- Reduced emissions
- Improved operational efficiency for ports, terminals and motor carriers
- Provide shippers better information to plan logistics of shipments

Barriers

- Multiple stakeholders involved
- Ability of small carriers to participate
- Incorporate wireless coverage for messaging
- Lack of standards for information exchange

Logistics

Directly Related Projects:
- Atlantic Provinces Advance Traveler and Tourist Information System (TI-1)

Technologies:
- Secure web site.
- CCTV
- Instant messaging
- Wireless device on-board

Estimated Resources:
- Start-up funding of $250,000

Participants

Lead Participant: Halifax Port Authority and the two Halifax container terminals.

EDIPORT ATLANTIC

Supporting Participants:
- Halifax Regional Municipality
- Halifax-Dartmouth Bridge Commission
- Motor carriers and shippers

ITS Definition

User Services: 5.5 Intermodal Freight Management
User Sub-Services: 5.5.1 Freight In-Transit Monitoring; 5.5.2 Intermodal Interface Management
Market Packages: CVO11 Freight In-Transit Monitoring, CVO12 Freight Terminal Management

Evaluation

The project is expected to result in reductions in delays and emissions. Specific measures would include:
- Travel times/wait times
- Volume of web site hits
- Volume of messages
- Number of subscribers to secure website

Target Start: Summer 2003

2003	2004	2005	2006	2007	2008

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Project No. CV-5

Port Container Security

PROPOSED PROJECT PROSPECTUS

Project Description

Pilot project to demonstrate the application of electronic cargo seals for inbound containers destined for the United States, as part of the Smart Border Initiative.

Need #1 – Expedited border crossing inspection and clearance for commercial vehicles
Need #6 – Expedited weight, credential and safety checks for commercial vehicles
Need #10 – Enhanced safety and security for travelers and for transportation operators and facilities
Need #12 – Enhanced tracking and real-time management of containers and other goods at intermodal terminals
Need #14 – Improved management of fleet transportation services

Benefits

- Improved security
- Reduced delays at intermodal terminals and border crossings
- Improved operational efficiency

Barriers

- Multiple stakeholders involved
- Lack of accepted international standards
- Need a champion
- Requires legislative and policy changes
- Liability and jurisdictional issues

Logistics

Directly Related Projects:
- CV-2 – New Brunswick Border Crossing Security and Electronic Clearance

Technologies:
- Electronic seals
- GPS tracking

Estimated Resources:
- TBD

Participants

Lead Participant: Ediport Atlantic and Halifax Port Authority

Supporting Participants:
- Transport Canada
- Smart Border Declaration stakeholders
- Canadian Customs and Revenue Agency
- U.S. Customs

ITS Definition

User Services: 5.1 Intermodal Freight Management, 5.5 Intermodal Freight Management, 5.6 Commercial Fleet Management
User Sub-Services: 5.1.2 International Border Crossing Clearance, 5.5.1 Freight-In Transit Monitoring, 5.6.2 Freight Administration
Market Packages: CVO2 Freight Administration, CVO3 Electronic Clearance, CVO5 International Border Crossing Clearance, CVO11 Freight In-Transit Monitoring

Evaluation

The success of this project would be measured through:
- Better location tracking
- Provision of tamper-proof security
- Improved throughput times

Target Start: Summer 2004

2003	2004	2005	2006	2007	2008

Project No. CV-6

Airport Groundside Transportation Management

PROPOSED PROJECT PROSPECTUS

Project Description

Optimize coordination of groundside transportation connections to Halifax International Airport, incorporating commercial bus services and taxi services, and tourism information.

Need #9 – Provide travel incentives and traveller information to promote tourism.
Need #14 – Improved management of fleet transportation services

Benefits

- Improved efficiency for bus operators
- Reduced delays
- Improved service for travelers

Barriers

- Identification of champion agency
- Funding model

Logistics

Directly Related Projects:
- Atlantic Provinces Advanced Traveller Information System (TI-1)

Technologies:
- Internet/kiosk
- Dedicated short-range communications

Estimated Resources:
- TBD

Participants

Lead Participant: Halifax International Airport.

Supporting Participants:
- Tourism industry
- Bus operators
- Taxi and limousine services

Evaluation

- Reduced delay times
- Improved customer service for travellers

ITS Definition

User Services: 1.1 Traveller Information, 5.6 Commercial Fleet Management
User Sub-Services: 1.1.2 Interactive Traveller Information, 5.6.1 Fleet Administration
Market Packages: ATIS2 Interactive Traveller Information, CVO1 Fleet Administration

Target Start: Spring 2004

2003	2004	2005	2006	2007	2008

Project No. CV-7

Commercial Fleet Management Program

PROPOSED PROJECT PROSPECTUS

Project Description

Consistent with the ITS America CVO Technical Committee initiative and the Commercial Vehicle Information Systems and Networks (CVISN), there is a push to introduce interoperable ITS/CVO systems throughout North America. This concept study would explore those opportunities to enable electronic information exchange among stakeholders and consider an incremental progression to result in improving roadside CVO, efficiency and safety.

Need #11: Improve management of fleet transportation services

Benefits

Major benefits of Commercial Vehicle Operations (CVO) that include fleet management are:

- Improving highway safety
- Streamlining administrative processes
- Reducing congestion costs
- Ensuring regulatory compliance
- Preserving investment in highway infrastructure

Barriers

Issues that must be considered in pursuing a fleet management program include:

- Lack of stakeholder buy-in (unknown benefits)
- Lack of technical standards
- Lack of adequate funding
- Failure to manage internal/external expectations
- Ability of vendors to deliver services in appropriate timeframes

Logistics

Directly Related Projects:

- Development of standards (Project underway by Transport Canada
- Harmonized Trucking Strategy

Technologies:

- Transponders
- Roadside communications
- Data Warehousing
- Weight-in-Motion
- Vehicle Classification

Estimated Resources:

- TBD

ITS Definition

User Service: 5.6 Commercial Fleet Management
Sub-services: 5.6.1 Fleet Administration; 5.6.2 Freight Administration; 5.6.3 CVO Fleet Maintenance.
Market Package(s): CVO01 Fleet Administration, CVO02 Freight Administration, CVO09 CVO Fleet Maintenance

Participants

Lead Participants: Commercial vehicle industry and provincial carrier enforcement agencies.

Supporting Participants:

- Trucking Associations
- Province of Quebec Commercial Vehicle Operations Program
- E-Z Pass System

Evaluation

As a concept study, evaluation would focus on the benefits and feasibility that are anticipated with implementation of simulations, prototypes, operational tests and pilots.

A survey of stakeholders would provide useful input to applications that most benefit the industry and government involvement.

Target Start: Spring 2003					
2003	2004	2005	2006	2007	2008

Project No. EM-1

Wireless Network Expansion

PROPOSED PROJECT PROSPECTUS

Project Description

Develop program to encourage wireless network providers to expand cellular network coverage to include rural highway routes.
The project would consist of:

- Understanding private sector network expansion plans
- Investigating ITS needs in greater depth
- Identifying methods to encourage expansion

Need #7 – Road emergency notification and information system for rural areas
Need #11 – Enhanced ability to detect, verify, and respond to incidents on major roadways

Benefits

- Improved incident response time
- Improved effectiveness of response/clearance
- Reduced impact to society
- Represents an enabling technology for other ITS initiatives
- Improved safety and security on the roadways in the coverage areas

Barriers

- Cost of additional cell site deployment
- Requirement for business case
- Justification of business case in rural and remote areas

Logistics

Directly Related Projects

- All projects requiring wireless communications

Technologies:

- Proven telecommunications technologies
- Emergency wireless E911 technologies

Estimated Resources:

- Requires the addition of cell sites to expand wireless network coverage beyond urbanized areas and major highway routes
- Approximate costs of $25,000-$100,000 per cell site

Participants

Lead Participants: Telecommunications service providers including Aliant and Rogers AT&T

Supporting Participants:

- Provincial governments
- Municipal governments

ITS Definition

User Services: 6.1 Emergency Notification and Personal Security
User Sub-Services: 6.1.1 Personal Security
Market Packages: EM3 Personal Security and MAYDAY Support

Evaluation

This project is expected to reduce rural incident response and clearance times. Performance measures include:

- Incident detection, response, and clearance times
- Transportation-related 911 calls processed

Target Start: Spring 2003					
2003	2004	2005	2006	2007	2008

Project No. EM-2

Atlantic Provinces Disaster Response Plan Scoping Study

PROPOSED PROJECT PROSPECTUS

Project Description

Each province currently has an Emergency Measures Organization, which prepares and provides support to mitigate the effects of natural and man-made disasters.

This scoping study would review the existing disaster response strategies and determine opportunities for ITS to support responses to natural and man-made disasters. Transportation and monitoring needs would be mapped against existing capabilities to determine where ITS initiatives could bridge any deficiencies.

Need #2 – Reduce rural road collisions through early detection of adverse conditions
Need #3 – Reduce the incidence, severity and cost to community of road collisions
Need #7 – Road emergency notification and information system for rural areas

Benefits

- Obtain a better knowledge of emergency capabilities and limitations that exist with current systems/infrastructure
- Establish an understanding of required needs and potential ITS solutions
- Educate Provincial Emergency Measures Organizations regarding the potential for ITS applications to support their plans

Barriers

- The project would require substantial input from many operating authorities, agencies, jurisdictions, emergency services, etc.
- By nature, disasters are random events and planning for such variability will be a challenge
- Lack of agreed-upon incident management procedures

Logistics

Directly Related Projects:
- None

Technologies:
- All monitoring, communications and information dissemination technologies

Estimated Resources:
- Scoping Study - $85,000 - $95,000

Participants

Lead Participant: Provincial Emergency Measures Offices (EMO) and New Brunswick Department of Public Safety

Supporting Participants:
- Provincial Transportation Departments
- Emergency Services
- Transport Canada Security and Emergency Preparedness

ITS Definition

User Service: 6.3 Disaster Response and Management
Sub-Services: 6.3.1Disaster Command and Control and 6.3.2 Disaster Information Dissemination
Market Packages: EM1 Emergency Response Management and EM4 Disaster Command and Control

Evaluation

Evaluation is to be determined through the course of the study.

Target Start: Spring 2003

2003	**2004**	**2005**	**2006**	**2007**	**2008**

5.2 DEPLOYMENT PLAN

5.2.1 Deployment Schedule and Phasing

In order to better guide the implementation, allow for evaluation of progress, and permit proper allocation of financial resources, the deployment schedules for the various projects have been sub-divided into major phases, as applicable, including the following categories:

- Planning, legislation and research activities;
- Design of the system or infrastructure;
- Procurement of the required technologies and pilot project installation; and/or
- Full deployment or construction of the project.

Included in Exhibit 5.2 – Implementation Plan, is a summary of the estimated project implementation time frames. The proposed timeframes have been reviewed with stakeholders at the workshop, but are subject to further refinement and definition though the project development process. It is the responsibility of the lead participants to take the initiative to draw upon the information as provided through the Strategic Planning process, and assemble the appropriate rationalization and coordination of resources as required to undertake the projects. The deployment details and project phases of each project are outlined below.

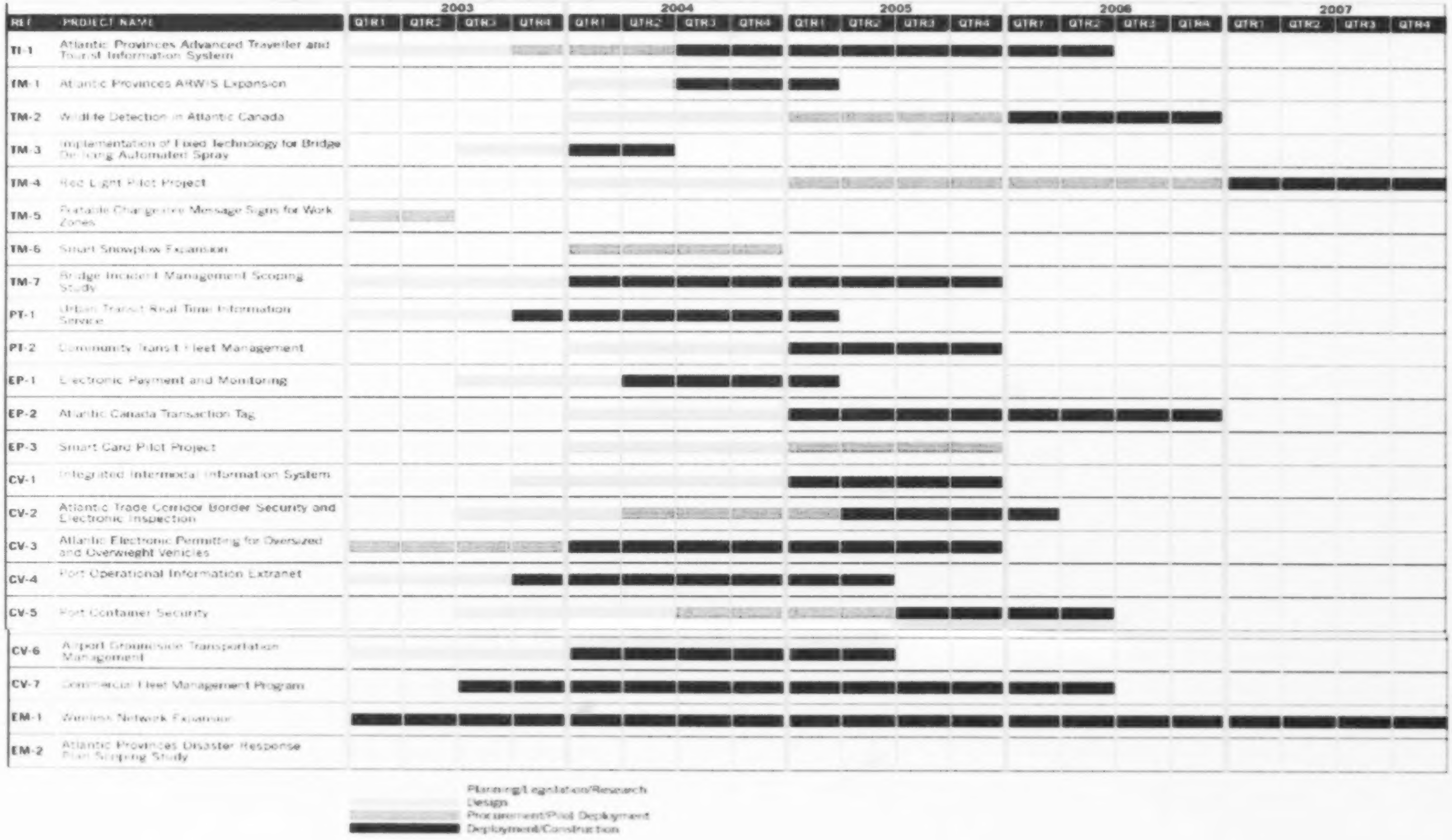
TI-1 Atlantic Provinces Advanced Traveller and Tourist Information System

The traveller information project represents a high priority in the region and as such has a start date of 2003. The first stage in the project is a planning component to determine the required functionality of the project and the associated traffic and traveller information needs. Following this stage, a pilot project would be deployed in New Brunswick. It is anticipated that together, these two projects will require eighteen months to complete. In conjunction with the above two aspects of the study, the data structure and storage, as well as the functionality of the data warehouse can be determined by the participating jurisdictions. Region-wide deployment of the data warehouse and traveller information system would follow on the completion of the pilot project and the planning for the warehouse. It is estimated that full deployment will take two years to complete.

TM-1 Atlantic Provinces ARWIS Expansion

The Provinces currently have a network of functioning ARWIS sites and have participated in national programs with Environment Canada to review technology, communications and reporting structures. Research efforts associated with available technologies have not been included in the project. In order to secure the necessary funding, a 2004 start date has been identified. A six-month design component has been incorporated into the deployment plan to provide for an opportunity to review the existing ARWIS coverage, coverage needs and site selection/design. Subsequent to this activity it is estimated that the installation of the sites will require nine months.

Exhibit 5.2 – Implementation Plan



TM-2 Wildlife Detection in Atlantic Canada, Scoping Study and Pilot Project

The pilot project will be twofold. Firstly, research will need to be conducted to identify the best available detection/warning technologies and the high vehicle-animal collision locations in New Brunswick. Starting in January of 2003, a twelve-month timeframe is estimated for these tasks.

The second stage of the project is expected to be completed in a twenty-four month period and will include the site design, the pilot test installation and project assessment. Further expansion to other sites will be based on the success of the pilot project.

TM-3 Implementation of Fixed Automated Spray Technology (FAST) for Bridge De-icing

This safety project includes design and implementation phases. The design phase will include a review of the available technologies and the design of the spray system for given the characteristics of the bridge. These tasks would be followed up by the installation of the system. The project is likely to proceed commencing mid-2003 and will require approximately six months for each of the two stages.

TM-4 Red Light Camera Pilot Project

The Province of Newfoundland does not currently have legislation for the use of red light cameras (RLCs) for enforcement. Legislation is currently being pursued by the City of St. John's. Twelve months have been allocated to the completion of this process, and the enactment of local by-laws.

The design phase includes two components. Firstly, an assessment of the red light camera violations in the City is required to determine high collision/infraction locations and the road user safety implications. Secondly, the equipment specifications and site designs will need to determined. The completion of the latter will, in some part, overlap with the procurement phase. Together, these two components will have an approximate duration of twelve months.

The procurement and pilot project stage will include the preparation and execution of a competitive tender, the installation of red light cameras at the high violation sites, an assessment of their impact on safety and the financial implications of installing, operating and maintaining the system. A minimum of twenty-four months will be required to complete these activities.

Should the safety benefits of the RLCs outweigh the costs associated with their operations, a twelve-month period has been allocated for the expansion of the RLC coverage.

TM-5 Portable Changeable Message Sign (PCMS) for Work Zones

PCMS technologies are relatively well developed and therefore the activities of this project relate to procurement and installation the signs at large construction projects. In order to use this technology in the 2003 roadway construction season, a six-month procurement schedule has been identified to begin in January of 2003.

TM-6 Smart Snowplow Expansion

Smart snowplows are already in use in the Atlantic Region along the Fredericton-Moncton Highway and in the City of Halifax. This project would include the procurement of additional units to expand the fleet and coverage area. A procurement timeframe of twelve months during 2004 is estimated. The latter start date reflects the time required to secure funding for the project.

TM-7 Bridge Incident Management Scoping Study

The study would commence in 2003 and the timeframe is estimated to be twelve months. As the project is a scoping study, it represents a planning task and is shown in the deployment schedule as such. The decision to undertake a pilot installation or full deployment of an incident management system would be determined based on the findings of this study.

PT-1 Urban Transit Real-Time Information Service

The design of the system and its components would be undertaken in 2003 and is estimated to be completed in nine months. Implementation of the system would include improved customer contact services followed by an initial deployment of kiosks and/or passenger information displays. These components are anticipated to be completed in approximately 18 months and would follow the design phase.

PT-2 Community Transit Fleet Management

The first stage of this proposed project is a feasibility study to review the integration of the public and private transit service provisions in PEI. As this study represented a medium level priority, a project commencement of 2004 was established. The duration of the feasibility study is estimated to be twelve months followed by a twelve month period for implementation of the resulting system.

EP-1 Parking Electronic Payment and Monitoring

A design component of approximately nine months is planned to begin mid 2003. This component would assess the available technologies and the need and justification for the installation of the system at the City's parking facilities. This stage would be followed by an implementation phase of approximately twelve months.

EP-2 Atlantic Canada Transaction Tag

The two components of the project relate to the expansion of existing tag population/applications to other users and venues, and an assessment of the opportunities to integrate the back office functions of the participating entities. The first component of the study can begin in 2003 and will continue for approximately 12 months. The need, justification and design of a common back office will be reviewed subsequent to the initial stage. The duration of this phase will be a function on the number of agencies and participants established through the expansion efforts.

EP-3 Smart Card Pilot Project

The smart card pilot project consists of two stages and is planned to commence at the beginning of 2003. The first stage is a planning component to establish the participating agencies/service providers. The second stage is the design and pilot deployment stage to review available technologies, their application and relative benefits over the existing systems. The planning and pilot deployment stages are expected to expend approximately twelve and twenty four months, respectively. Opportunities to expand the card usage through out the region would follow from the results of the pilot deployment.

CV-1 Integrated Intermodal Information System

The project is anticipated to begin with a nine month planning stage in 2003. This stage will focus on engaging stakeholders such as Oceanex, the port authorities, carriers, etc. The design of field sites and data processing requirements will be undertaken in the fifteen months following the initial planning assignment. Deployment of the system at the Oceanex and other key locations would be undertaken over an estimated twelve-month period.

CV-2 Atlantic Trade Corridor Border Security and Electronic Inspection

Given the high priority need relating to enforcement and security at the international and provincial border crossings, a start date of January 2003 have been indicated. The combined planning and design phase of approximately fifteen months has been identified to engage the many stakeholders, and to design the site and data processing requirements. Implementation of a pilot system and full deployment are planned consecutively for two twelve-month periods subsequent to the initial stage of the project. These study timelines may be fast-tracked based on the recent priorities placed on security and through the use of existing programs such as NEXUS.

CV-3 Atlantic Canada Electronic Permitting for Oversized and Overweight Vehicles

The Province of New Brunswick in conjunction with other supporting participants is currently pursuing this initiative and is presently addressing institutional issues. A pilot deployment is anticipated in 2003 with the potential for further expansion or region wide deployment in 2004.

CV-4 Port Operational Information Extranet

This two-phase project is anticipated to begin in 2003. A conceptual design for the system has already been developed and a nine month design phase will be required to complete the design of the information system. The second phase will continue for approximately 18 months and include the deployment and assessment of the pilot installation.

CV-5 Port Container Security

The three and half year schedule for this project reflects the number of stakeholders and the security issues that will be consider in all aspects of this project. The project initiation is anticipated in 2003. The sequential phases and their estimated duration are as follows:

- Planning of the system and its operations through consultation with enforcement agencies and users – six months;
- Design of the tracking and recording system – twelve months;
- Pilot project deployment – twelve months; and
- Implementation of the security system – twelve months.

Given the high priority that has been recently placed on cross-border security, there may be opportunities to "fast-track" a pilot deployment.

CV-6 Airport Groundside Transportation Management

It is anticipated that approximately twelve months will be required to consult with the various stakeholders and undertake the design of the information management system. With the completion of the design in 2003, implementation would follow in the subsequent 18 months.

CV-7 Commercial Fleet Management Program

A project spearheaded by the commercial trucking industry, the first phase would include the planning of the operational and management needs of the system. It is expected that the implementation and expansion of the system would occur over the next 36 months following the planning stage.

EM-1 Wireless Network Expansion

The major telecommunications service providers in the Atlantic Region are planning expansion to their wireless networks in 2003. Accordingly, project timeframe has been identified as an on-going effort commencing in 2003.

Wireless networks and technologies are well established in the Atlantic Provinces' urban areas. The purpose of this study is to assist in building the business case for wireless network expansion by identifying ITS benefits on an area-by-area basis, e.g., emergency management, traveller information, etc. Business case development is part of the telecommunications service providers' core business. For these two reasons, the project profile does not include a formal planning or a design stage.

EM-2 Atlantic Provinces Disaster Response Plan Scoping Study

The nature of this study is to review opportunities to dovetail ITS technologies and infrastructure with the existing and planned Provincial emergency management activities/plans. The study represents the groundwork and planning for future initiatives and thus has been identified as a planning exercise. Given the scope of the project and the number of organizations to be consulted with, it is anticipated that a twelve month time frame will be required for completion.

5.2.2 Project Participants and Available Resources

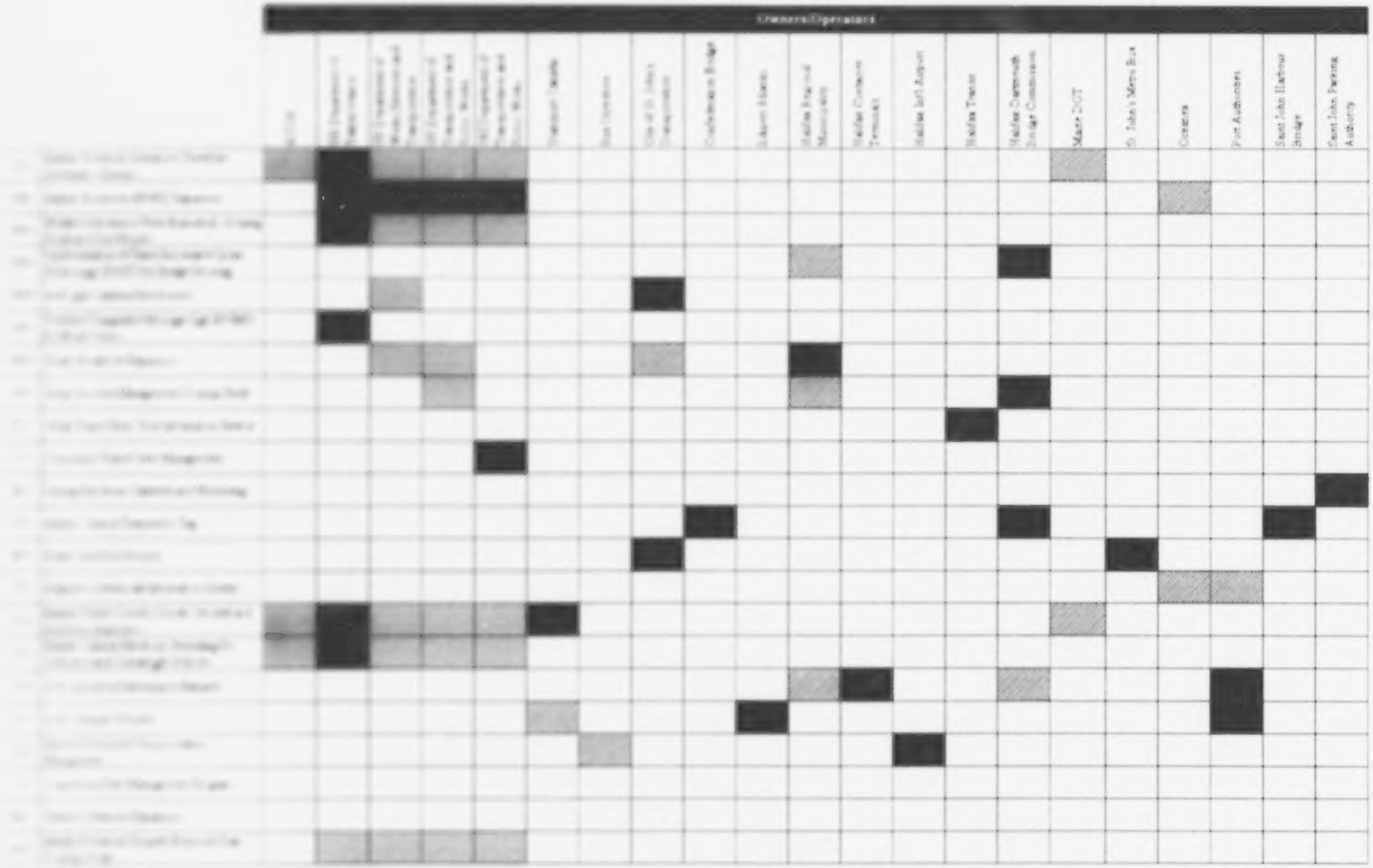
The implementation of strategic projects can become hindered if considerable resources are required from key stakeholders through their participation as lead or supporting entities in a number of initiatives. Recognizing that lead and supporting agency staff resources are essential in the initiation, management and/or undertaking of the strategic projects, a high level review of the project commitments for each major agency or group was carried out.

The lead and supporting participants were categorized based on the general groupings outlined in Section 3 – the Opportunities Analysis, which cover the key beneficiaries and delivery participants of the Strategic Plan.

A matrix was created, which tracks projects on one axis versus the stakeholders on the other axis. The list of stakeholders is not meant to be exhaustive, but to include the major players that have the potential to be involved the planning and deployment activities for a number of projects. To better understand their commitments, in each case the participation was identified as a lead or supporting role in the project. Included in Exhibit 5.3 is a summary of the projects mapped against the intended lead and supporting agency obligations, with the following groups identified:

- Owner/operators;
- Customer service providers;
- Researchers, enforcement authorities, emergency service providers; and
- Other agencies, jurisdictions or departments.

Exhibit 5.3 – Agency / Jurisdiction Project Commitments



	Owners/Operators																				
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■ Lead Participant
▨ Supporting Participant

	Consumer Service Providers														Researchers		Enforcement Agencies			
	AVI/RFID suppliers	Atlantic Provinces Trucking Association	Commercial Vehicle operators and shippers	E-Z Pass System	Ferry Operators	Financial Inst.	Information Service Providers	Retail operators and parking garages	Suppliers of RWIS equipment and chemicals	Taxi services, shuttle buses and other private carriers	Technology Manufacturers	Telecommunication Services (Aliant, Rogers AT&T)	Transmission services (on behalf of motor carriers)	Winter maintenance contractors	Memorial University	University of New Brunswick	Canada Customs and Revenue Agency	Other Police Services	RCMP	US Customs
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■ Lead Participant
▨ Supporting Participant

		[illegible]				Other Participants													
		Emergency service providers	NB Dept of Public Safety	Provincial Emergency Management Offices (EMO)	Transport Canada Security and Emergency Preparedness	Council of Atlantic Premiers	Environment Canada	Industry Canada	NB Natural Resources and Energy	NB Dept of Public Safety	NB Other Departments	NB Tourism	NF Dept of Industry, Trade, Rural Development	NF Other Departments	NS Other Departments	NS Tourism	Service NS and Municipal Relations	PEI Other Departments	Quebec CVO Program	Transport Quebec
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■ Lead Participant

▨ Supporting Participant

Based on a review of the planned roles, the following are concluded:

- The owner/operator of a system is generally identified as having a lead role in the project;

- The four provincial transportation departments represent the largest presence of lead roles, being implicated for some involvement in six to eight of the strategic projects

- The Newfoundland Department of Works, Services and Transportation is planned to provide a lead role in one project and a supporting role in seven others. The lead role, namely the Atlantic Provinces ARWIS Expansion (TM-1)), is in cooperation with other Provincial counterparts. In addition, these projects will make demands on separate divisions of the Department.

- The Nova Scotia Department of Transportation and Public Works has been identified as a lead participant in one project and a supporting participant in seven others. The lead role is in conjunction with the other Provincial counterparts for the projects identified for the Newfoundland Department of Works, Services and Transportation.

- The Prince Edward Island Department of Transportation and Public Works is identified in two lead roles and five supporting participant roles. In to the Atlantic-wide initiative identified above, their lead is identified in the Community Transit Fleet Management project (PT-2). The PEI Department of Transportation and Public Works will need to consider their level of involvement in these projects and the timing of each, with a view of resolving any resource limitations.

- The New Brunswick Department of Transportation is identified in seven project roles including six as lead participants in projects all starting in early 2003. Although these lead roles span a number of divisions within the department, New Brunswick DOT staff resources may not be able to provide this level of effort given their other commitments. A review of staff requirements and resources will need to be undertaken to identify any deficiencies.

- Police services are identified for participation in four projects and in all cases in supporting roles. This level of involvement reflects the prevalence of safety related and enforcement activities inherent to many of the projects;

- With the prevalence of CVO related strategic projects, commercial vehicle carriers and shippers are included as participants in five projects. Their role is generally a supporting participant with the exception of their lead in the Commercial Fleet Management Program project;

- Halifax-Dartmouth Bridge Commission is involved in four projects with lead roles in three of the projects. The three lead projects relate to an incident management system, the Atlantic Canada transaction tag and a fixed automated spray technology system for the bridge. Given the nature and timing of these projects, demands on staff resources do not appear to be a barrier.

- The Halifax Regional Municipality is involved in four projects including a lead role in the Smart Snowplow Expansion (TM-6) project. These projects will be spread over a number of departments and as such do not appear to represent a critical loading.

- City of St. John's is identified as a lead participant in the Red Light Camera Pilot Project (TM-4) and the Smart Card Pilot Project (EP-3). Given that these two projects would involve separate divisions, namely the traffic and transit divisions, a lead role for both these projects should be manageable. A supporting role is also anticipated in the Smart Snowplow Expansion (TM-6) initiative.

- The Saint John Parking Authority is identified as the lead agency for the Parking Electronic Payment and Monitoring Project (EP-1).

- The Atlantic Canada Opportunities Agency (ACOA) is identified in three projects, all of which include a supporting role.

5.3 DEVELOP ACTION PLAN FOR ONGOING EVALUATION

5.3.1 Strategic Program Management

The goal of the Action Plan for Ongoing Evaluation is to design a framework for the stewardship of the overall Atlantic Provinces Regional ITS Strategic Plan.

The specific tasks include:

- Project tracking process;

- Provide a resource group to make suggestions if a project is encountering difficulties; and

- Disseminate information on the ITS activities to stakeholders in the Atlantic Region.

The tools to be used to oversee the Action Plan:

- Establishment of a permanent Atlantic Provinces ITS Steering Committee;

- Maintenance of the ITS roundtable; and

- On-Going engagement of stakeholders.

Establishment of Atlantic Provinces ITS Steering Committee

In order to maintain momentum and focus on the implementation of the Strategic Plan, it is extremely important to establish a permanent Atlantic Provinces ITS Steering Committee. The committee should consist of, as a minimum, representatives of:

- New Brunswick Department of Transportation;

- Nova Scotia Department of Transportation & Public Works;
- Prince Edward Island Department of Transportation & Public Works;
- Newfoundland & Labrador Department of Works, Services & Transportation;
- Transport Canada;
- Atlantic Canada Opportunities Agency; and
- A representative of the academic/research community in Atlantic Canada.

The government members of the Steering Committee will share information on:

- Changes to regional institutional, legislative and technical barriers;
- Projected effects of policy and regulatory changes on the performance of the existing transportation infrastructure;
- Opportunities for ITS to address existing challenges in maximizing the efficiency of the existing infrastructure;
- Environmental, economic and social policies that can contribute to the development of the ITS infrastructure in the region.

The academic/research member of the Steering Committee will provide input on:

- Opportunities to promote and apply ITS research in the Atlantic Provinces;
- Opportunities for partnerships and the role of research centres of excellence in developing and implementing "early winner" ITS deployments.

Maintenance of the ITS Roundtable

Another important facet of the action plan is the maintenance of the ITS Roundtable which was established as part of Step 6 of the study. It is recommended that the ITS Steering Committee conduct a conference call once every 6 months to discuss the implementation of the plan, industry developments.

The original roundtable group convened for the study included approximately 17 individuals, with 4 members from each of New Brunswick, PEI, and Newfoundland, and 5 from Nova Scotia. Public sector participants were six in number while the private sector had 8 members. One individual represented the academic sector and the "other" category consisted of 1 representative each from an authority and a commission.

Before the initial meeting with the ITS Roundtable, the ITS Steering Committee should meet and discuss the membership. The membership should be adjusted to reflect demonstrated interest and contribution to the roundtable discussions, and the level of ITS and ITS-related activity of the participants.

Ongoing Engagement of Stakeholders

It is important to continue the dialogue initiated through this project. Mechanisms include hosting of the 2003 ITS Canada meeting in Fredericton, generation of a regional architecture and the maintenance of ITS Atlantic web-site. The latter two opportunities are further detailed in the following paragraphs.

Regional ITS Architecture

Success in ITS planning is predicated upon effective coordination between organizations, at both an institutional and technical level. As previously noted, the ITS Architecture for Canada provides a common framework for deployment and integration of ITS. However it is unlikely that any single area, province, or even region would plan to implement the entire architecture. Therefore, the ITS Architecture for Canada can be tailored to local needs, producing what is referred to as a regional ITS architecture. A regional ITS architecture identifies the functions, organizations, and information flows that are relevant to the area, as well as those that are planned for the future. As well, regional architectures can provide different institutional views. This provides stakeholders customized views from their perspective, allowing them to identify opportunities for integration and co-operation.

The development of a regional ITS architecture for the Atlantic Provinces would be facilitated greatly by the results of this Strategic Plan development, as well as from the fact that active representatives of the stakeholder community have already been identified and brought together as part of the project.

It should be noted that the real success of a regional ITS architecture effort hinges on effective use of the architecture once it is developed. A regional ITS architecture is an important tool for use in transportation planning and project implementation. As indicated, it can identify opportunities for making ITS investments in a more cost-effective fashion. This step is where the benefits are realized.

Atlantic ITS Website

The Atlantic ITS Website is established and has a profile. It can be used to post announcements concerning staff changes, new projects, relevant events, and project progress reports. A permanent host, and website administrator will need to be established.

Action Plan Structure

The proposed frequency of the ongoing monitoring and maintenance of the Plan is outlined in Exhibit 5.4.

Exhibit 5.4 – Action Plan Activities

Action Plan Activity	Frequency	Tasks
Steering Committee	4 times per year	• Meet via conference call • Discuss events which impact, or potentially impact the ITS Strategic Plan • Review overall Strategic Plan schedule • Review project status reports

Exhibit 5.4 – Action Plan Activities

Action Plan Activity	Frequency	Tasks
Roundtable	2 times per year	• Steering Committee to meet with Roundtable 2 times per year, in conjunction with regular steering committee meeting
Website	4 times per year	• Website to be updated 4 times per year, following each Steering Committee meeting • Website to report on key topics of discussion, and project status reports
Project Status Reports	One per year	• Project Managers requested to complete and submit annual status reports, using the standard template

5.3.2 Strategic Project Evaluation

It is envisioned that the Atlantic Provinces ITS Strategic Plan be evaluated through collection of relevant "before" data, annual reviews of project progress, and a formal five-year update. The three components are outlined below:

Collection of "Before" Data

In Step 2 of the Plan, general performance criteria were identified for each User Service for future evaluation purposes. These criteria were carried forward and mapped against the strategic projects to provide a basis to determine data collection needs, specifically, the "before" data requirements. Included in Exhibit 5.5, is a summary of the applicable performance criteria, by project. Also included in Exhibit 5.5, is a summary of the data that should be collected prior to the project initiation/implementation, to permit the assessment of the benefits.

Exhibit 5.5 – General Performance Criteria and Before Data Collection Requirements

Project	Step 2 – Performance Criteria											Before Data to be Collected	Candidate for Online Monitoring
	Reduction in Delay	Reduction in Fuel Used	Reduction in Pollutant Emissions	Increase in Schedule Reliability	Reduction in Collisions	Reduction in Response Time	Reduction in Duration of Incident	Level of User Acceptance/Satisfaction	Increase in Tourism-Related Revenue	Reduction in Public Cost	Improvement in Quality of Life		
Atlantic Provinces Advanced Traveller Information System	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	• Annual business revenue related to tourism • Number of "hits" on existing traveller information web sites (e.g. www.newbrunswick.world.web.com) • Number of ferry trips per year and associated passenger volume	✓ ✓
Atlantic Provinces RWIS Expansion	◆	◆	◆	◆	◆	◆				◆	◆	• Number and rate of (total and fatal) collisions • Number and rate of (total and fatal) collisions per registered vehicle, where weather and/or road surface was a contributing factor • Percentage of drivers that have access to information prior to trip • Coverage area per winter maintenance vehicle • Current annual budget spent by jurisdictions collecting data on road and weather conditions • Current annual budget spent by jurisdictions on road surface maintenance related to weather conditions	✓
Wildlife Detection in New Brunswick [illegible] Study and Pilot Project					◆					◆	◆	• Number and rate of (total and fatal) wildlife-vehicle collisions	
Implementation of Fixed Automated Spray Technology (FAST) for Bridge De-icing	◆	◆	◆	◆	◆	◆				◆	◆	• Number of roadway (total and fatal) collisions • Rate of road collisions per registered vehicle passing bridge, where weather and/or road surface was a contributing factor • Assessment of current state of bridge with regards to corrosion and chloride loading in the surrounding environment	

Exhibit 5.5 – General Performance Criteria and Before Data Collection Requirements

Project	Step 2 – Performance Criteria											Before Data to be Collected	Candidate for Online Monitoring
	Reduction in Delay	Reduction in Fuel Used	Reduction in Pollutant Emissions	Increase in Schedule Reliability	Reduction in Collisions	Reduction in Response Time	Reduction in Duration of Incident	Level of User Acceptance/Satisfaction	Increase in Tourism-Related Revenue	Reduction in Public Cost	Improvement in Quality of Life		
Red Light Camera Pilot Project					◆					◆	◆	• Cost of traditional enforcement techniques (i.e. operating cost before implementation) • Number and rate of (total and fatal) collisions at candidate intersections, and at "control" intersections	
Portable Changeable Message Sign (PCMS) for Work Zones	◆	◆	◆	◆	◆	◆		◆		◆	◆	• Average vehicle speed in work zone • Number and rate of (total and fatal) collisions in a work zone • Average delay per vehicle incurred in work zones	✓
RWIS Snowplow [illegible]	◆	◆	◆	◆	◆	◆				◆	◆	• Number and rate of (total and fatal) collisions where presence of snow on roads was a contributing factor • Number and rate of (total and fatal) collisions per registered vehicle, where weather and/or road surface was a contributing factor • Current annual amount of salt used to de-ice roads, by jurisdiction • Current annual budget spent by jurisdictions on road surface maintenance related to weather conditions	✓
Bridge Incident Management Scoping [illegible]	◆	◆	◆		◆	◆	◆			◆	◆	• Number and rate of (total and fatal) collisions • Average response time between apparent time of incident and arrival of appropriate response team • Number of false alarms • Average time between time of incident and reopening of road • Number of secondary incidents • Average time lost to delay	✓ ✓
Urban Transit Real-Time [illegible]	◆	◆	◆	◆	◆			◆		◆	◆	• Annual ridership, by route • User attitudes survey	✓

Exhibit 5.5 – General Performance Criteria and Before Data Collection Requirements

Project	Step 2 – Performance Criteria											Before Data to be Collected	Candidate for Online Monitoring
	Reduction in Delay	Reduction in Fuel Used	Reduction in Pollutant Emissions	Increase in Schedule Reliability	Reduction in Collisions	Reduction in Response Time	Reduction in Duration of Incident	Level of User Acceptance/Satisfaction	Increase in Tourism-Related Revenue	Reduction in Public Cost	Improvement in Quality of Life		
Community Transit Fleet Management				●				●		●	●	• Annual ridership for existing services	✓
												• User attitudes survey	
												• Percentage of on-time end-station arrivals	✓
Parking Electronic Payment and Monitoring	●	●	●	●				●	●	●	●	• Human resources to administer existing system	
												• Parking lot/space utilization	✓
												• Average queue time to enter parking lot	
												• User attitudes survey	
Atlantic Canada Transaction Tag	●	●	●	●				●	●	●	●	• Total operating costs with segregated "back offices"	
												• Size of current tag population	✓
												• Number of tag holders already using proposed partners/applications (i.e. tolls, parking, ferry service and retail services)	✓
												• Parking lot/space utilization	✓
Smart Card Pilot Project								●		●	●	• Annual ridership for existing services	✓
												• Current revenue processing of costs	✓
[illegible]	●	●	●	●	●					●	●	• Number of vehicles that could participate in the WIM system	
												• Average delay per commercial vehicle weighed/inspected	✓
												• Percentage of commercial vehicles either known to be safe (carrier has good safety record) or checked at least once during a given trip	
												• Number and rate of (total and fatal) collisions involving commercial vehicles	
												• Number and rate of (total and fatal) collisions involving commercial vehicles with safety defects	

Exhibit 5.5 – General Performance Criteria and Before Data Collection Requirements

Project	Step 2 – Performance Criteria											Before Data to be Collected	Candidate for Online Monitoring
	Reduction in Delay	Reduction in Fuel Used	Reduction in Pollutant Emissions	Increase in Schedule Reliability	Reduction in Collisions	Reduction in Response Time	Reduction in Duration of Incident	Level of User Acceptance/Satisfaction	Increase in Tourism-Related Revenue	Reduction in Public Cost	Improvement in Quality of Life		
Atlantic Trade Corridor Border Security and Electronic Inspection	◆	◆	◆	◆	◆					◆	◆	• Average delay per vehicle • Average processing time per vehicle • Annual operating costs of border crossing inspection processes	✓ ✓
Atlantic Electronic Permitting for Oversized and Overweight Vehicles	◆	◆	◆	◆	◆					◆	◆	• Average delay per commercial vehicle during permit issuing process • Number and rate of (total and fatal) collisions involving oversized and overweight commercial vehicles • Estimated cost of asset (road/bridges) damage incurred due to oversized/overweight vehicles • Operating costs (including human resources requirements) to issue permits	✓
Port Operational Information Exchange	◆	◆	◆	◆						◆	◆	• Average wait time • Ratio of containers in-terminal to containers docked • Percentage of on-time deliveries • Current methods of information collection and dissemination, and resources required to perform this service • User attitudes survey	✓ ✓ ✓

Exhibit 5.5 – General Performance Criteria and Before Data Collection Requirements

Project	Step 2 – Performance Criteria											Before Data to be Collected	Candidate for Online Monitoring
	Reduction in Delay	Reduction in Fuel Used	Reduction in Pollutant Emissions	Increase in Schedule Reliability	Reduction in Collisions	Reduction in Response Time	Reduction in Duration of Incident	Level of User Acceptance/Satisfaction	Increase in Tourism-Related Revenue	Reduction in Public Cost	Improvement in Quality of Life		
Port Container Security	◆	◆	◆	◆	◆					◆	◆	• Percentage of containers tampered with	
												• Percentage of on-time deliveries	✓
												• Average waiting time to process at intermodal terminal and border crossing	✓
												• Average processing time per container	✓
												• Current resources required to perform this service	
Airport Groundside Transportation Management	◆	◆	◆	◆	◆			◆		◆	◆	• Annual number of customers by transportation mode	✓
												• Average delay time per customer	✓
												• User attitudes survey	
												• Percentage of on-time arrivals/departures of bus and taxi services	✓
												• Annual operating costs for groundside transportation service providers	
Commercial Fleet Management Program	◆	◆	◆	◆						◆	◆	• Average congestion costs and delay	
												• Number and rate of (total and fatal) collisions involving commercial vehicles	
												• Annual administrative operating costs	
												• Human resources requirements to manage fleet services	
Wireless Network Expansion						◆				◆	◆	• Proportion of drivers able to initiate an emergency notification call	
												• Number of transportation-related 911 calls	✓
												• Number and rate of (total and fatal) collisions in rural areas	
												• Average response time between apparent time of incident and arrival of appropriate response team	✓
												• False alarm rate	
												• Average time between time of incident and reopening of road	✓
												• Number of secondary incidents	

Exhibit 5.5 – General Performance Criteria and Before Data Collection Requirements

Project	Step 2 – Performance Criteria											Before Data to be Collected	Candidate for Online Monitoring
	Reduction in Delay	Reduction in Fuel Used	Reduction in Pollutant Emissions	Increase in Schedule Reliability	Reduction in Collisions	Reduction in Response Time	Reduction in Duration of Incident	Level of User Acceptance/Satisfaction	Increase in Tourism-Related Revenue	Reduction in Public Cost	Improvement in Quality of Life		
Atlantic Provinces Disaster Response Plan Scoping Study						◆				◆	◆	• Current information dissemination processes – coverage, and anticipated time required to contact all members of the public • Percentage of drivers that have immediate, in-vehicle access to relevant information • Percentage of drivers that have access to relevant information prior to their trip • Proportion of drivers able to initiate an emergency notification call	

Annual Review

As the implementation plan is built upon a start date of 2003, it is recommended that a yearly review of project progress be undertaken to identify deviations from the original scope or time frames. To assist in the timely and consistent review of the project progress by each lead jurisdiction, a common template should be developed. Provided in Exhibit 5.6 below is the major components and the associated content that could be included in the template.

Exhibit 5.6 – Annual Project Progress Review
Sample Template

Item	Content
Project Name and Reference Number	Project name and reference number as identified in the ITS Strategic Plan
Activities completed to date	A brief outline of major tasks completed to date with reference to the deployment plan schedule. A revised schedule of project activities should be included, as applicable.
Changes in project scope, if any	As the projects proceed, it may be advantageous to revise the scope of the project to better suit the needs and opportunities presented. Any major changes in scope should be identified including the primary reasons for the change.
Technology advancements	Given the nature of the technologies required for many of the projects, it is anticipated that advancements in technology will occur over time and during the project implementation. Any progression in a technology field should be identified.
Evaluation of system, if applicable	Both qualitative and quantitative evaluation of the project should be provided.
Revised list of participants	If any changes have been made to the lead and supporting participants, the modifications should be identified and reasons provided.
Partnership opportunities	Identification of partnerships that have been developed for the project. Details regarding the nature and extent of and the motivation for the partnership should be provided for others to take into account.
Funding opportunities	All internal and external funding that has been obtained or earmarked for the project should be identified. "In-kind" services should be included in this summary.

**Exhibit 5.6 – Annual Project Progress Review
Sample Template**

Item	Content
Barriers	Any barriers encountered in the project implementation or completion should be identified including their impact on the project progress. Measures undertaken or to be considered to remove the barriers should be acknowledged.
Atlantic province companies/services	Where Atlantic based firms, companies and service providers have been involved in the implementation of the project; the entity's name and contribution/expertise should be acknowledged for consideration by others in the region. Contributions should be categorized, as applicable, to the planning, design, procurement, deployment, or construction phases in the project.
Lessons Learned	Provision of any lessons learned that may prove beneficial to other projects, jurisdictions or companies.

This evaluation form would be distributed to the lead participant(s) for each project in January of each year starting in January 2004. Electronic distribution of the evaluation form is recommended to permit timely response and the ability to forward the form if the responsible agency or individual has changed over the course of the project. The annual report will be compiled and distributed by the Steering Committee and posted to the website.

Plan Update (Five Year Review)

It is recommended that a five year review of the Plan be undertaken to ensure that the Plan is "evergreen" and reflects the region's current needs, opportunities and objects, as they relate to ITS services. As noted in Section 5.3.1, it is recommended that a Steering Committee be established for the ongoing monitoring and management of ITS deployment in the Atlantic Region. It is anticipated that the ITS Steering Committee would undertake a five year review of the plan, the scope of which would be determined at the time of its commissioning.

6. ECONOMIC DEVELOPMENT AND ACADEMIC/RESEARCH

6.1 INTRODUCTION

The Atlantic Provinces Regional Intelligent Transportation System Strategic Planning Study incorporates a designated stand-alone activity that specifically addresses the economic and industrial development potential for the Atlantic Provinces through increased participation in the ITS industry. This section represents the findings of the study pertaining to economic development and academic/research. The section summarizes past efforts in this area, the ITS industrial capabilities within the region, and an analysis of the market opportunities. The results from this effort are targeted at representatives from all sectors with an interest in furthering Atlantic Provinces participation in the rapidly developing international market for ITS.

Whereas ITS is a technical field, this section minimizes reference to technical terms. In cases where this isn't feasible, footnotes explaining the term are provided at the first occurrence. In addition, a Glossary of Terms is provided for reference in Appendix J.

6.1.1 Goals and Objectives

The overall goal of the Economic Development and Academic/Research analysis is to promote the development of an ITS industrial base in Atlantic Canada. The more specific objectives of the work include:

- Creating an awareness within Atlantic Canada industry and academia of ITS technologies and the potential markets which are being created by their deployment;
- Assessing the capacity and potential for Atlantic Canada firms to respond to ITS requirements within the region, but also beyond;
- Assessing the potential marketplace for ITS technologies within Atlantic Canada, as well as the opportunities which might exist for the region's ITS firms to develop and/or provide products for use in international markets;
- Preparing local industry and academic partners to respond to the requirements and tenders for the supply of ITS technologies within the Atlantic Region.

The Economic Development and Academic/Research analysis is distinct, but directly related to the overall Atlantic Region ITS Strategic Planning effort. Where the overall study aims to develop a strategic vision and plan for the deployment of ITS technologies in Atlantic Canada, the Economic Development and Academic/Research analysis is aimed directly at promoting the development of an industrial base within the region that can supply the technologies and personnel required for the deployment and ongoing support of ITS in Atlantic Canada and beyond.

In essence, the work plan addresses economic development issues and needs. Much of the information developed in the primary workstreams of the study have been used as input to analysis. Where the primary workstreams in the study aim at defining mainly demand-side issues, the emphasis in the Economic Development and Academic/Research analysis is on supply side challenges and opportunities.

6.1.2 The Underlying Philosophy

In developing the work plan, an approach was deliberately framed around four fundamental principles:

- The work must emphasize practical and cost-effective approaches and solutions to specific Atlantic Region needs. The environmental scan and opportunities analysis elements of the primary work plan are expected to provide critical inputs into the efforts in this respect. There is a need to develop a clear understanding of needs, limitations, and perceived opportunities before the ability of industry and academia to respond can be addressed.

- The approach stresses a two-stage need: the desire to move forward immediately with ITS deployment to some degree; and the recognition that the presence of such technologies will generate the need for an intellectual and industrial base to sustain it in the long term.

- Partnership opportunities between industry and academia are not only desirable, but are critical to the continuing success of any ITS deployment efforts. Academia's logical roles in research, education, and training precisely complement the traditional industrial roles of research, product development, and implementation. In addition, academia will ultimately have an important role to play in fostering the development of the intellectual capital that can sustain these efforts over the long term as noted in the point immediately above.

- Industry and academia will only buy into the Economic Development and Academic/Research analysis if they were involved in, and contributed substantively to it, throughout its execution. Analysis efforts included important components of consultation, networking, and showcasing, to help ensure that this happens. These were closely coordinated with the consultation efforts of the primary study workstream.

6.1.3 The Approach

Exhibit 6.1 provides an overview of the approach to the Economic Development and Academic/Research analysis.

The work plan was built around three areas of effort:

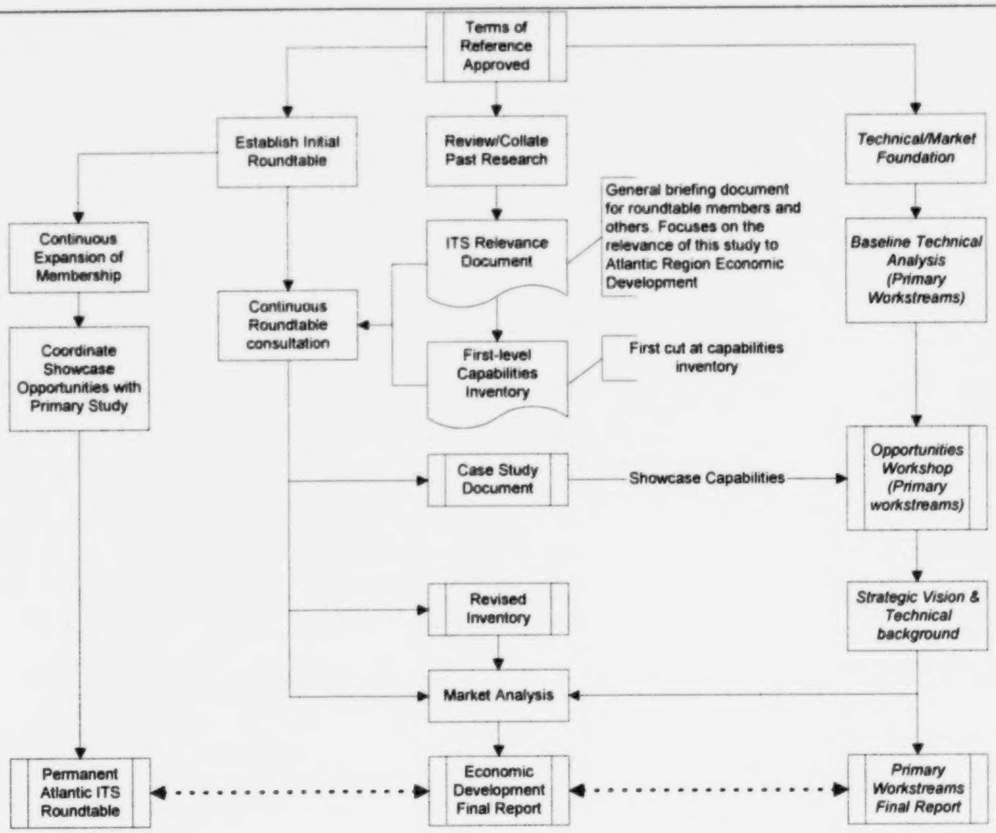
- Core deliverables;

- Consultative process;

- Integration with the overall study.

The core of the effort was dedicated to the actual development of the desired deliverables and focuses on an initial review of past work, consultations with industry and academia, a critical link to the outputs of the main strategic planning effort, and a sophisticated market and opportunities analysis.

Exhibit 6.1 – Overview of Approach


Terms of Reference Approved
Establish Initial Roundtable
Review/Collate Past Research
Technical/Market Foundation
General briefing document for roundtable members and others. Focuses on the relevance of this study to Atlantic Region Economic Development
Continuous Expansion of Membership
ITS Relevance Document
Baseline Technical Analysis (Primary Workstreams)
Continuous Roundtable consultation
Coordinate Showcase Opportunities with Primary Study
First-level Capabilities Inventory
First cut at capabilities inventory
Case Study Document
Showcase Capabilities
Opportunities Workshop (Primary workstreams)
Revised Inventory
Strategic Vision & Technical background
Market Analysis
Permanent Atlantic ITS Roundtable
Economic Development Final Report
Primary Workstreams Final Report

Note: Activities indicated in italics are associated with the Primary Study Activities (Steps 1 through 5)

An ITS Roundtable was established to serve as a consultative and review body for selected elements of the core work activities. The group included representation from industry, academic, and other stakeholders with primary interests and knowledge in ITS. It is through this representation that we begin to build the network of interested stakeholders that will be vital to supporting ITS activities in the long term. The ITS Atlantic website played a key role in terms of facilitating the communications among the ITS Roundtable throughout the course of the project, and conceivably will survive beyond the course of the project.

Finally, the effort addressed the need to continuously monitor and participate in the overall study workstream activities, so that information and contacts developed in the course of that work could be used as a basic input to the analysis efforts.

6.1.4 Deliverables

The following products/services were established for the Economic Development and Academic/Research analysis:

- The early creation of an Atlantic ITS Roundtable organization with a core initial membership from academia, the private sector, and government, together with ongoing management of and consultation with that group during the study period.
- An early "interim" ITS Capabilities/Inventory report.
- An early "ITS Relevance" document intended to provide an introductory-level discussion of the reasons for, and potential benefits flowing from the development of an ITS industrial base in Atlantic Canada. This document was used as an explanatory vehicle early in the consultative work.
- A Case Study document that was used as the basis for showcasing existing success stories and Atlantic Canada capabilities in ITS in Atlantic Canada. While the report was used primarily as an interim document for the showcasing activity, it also provided a foundation tool for marketing Atlantic Canada capabilities in ITS in the future.
- A final ITS Capabilities/Inventory report.
- Participation in the key Opportunities Workshop of the mainstream strategic planning activity.
- A Market Analysis report including an ITS Relevance Map and SWOT (Strengths, Weakness, Opportunities, and Threats) analysis.
- Through the Atlantic ITS Roundtable, facilitating the development of a proposal for the establishment of carefully focused ITS demonstration project to showcase Atlantic Canada capabilities nationally and internationally.
- A Final Report on the overall work of the analysis which includes a strategic plan component directed at the development an ITS Industrial Base in Atlantic Canada.

6.2 THE ITS ATLANTIC ROUNDTABLE

The creation of an Atlantic ITS Roundtable was one of the first priority steps in the Economic Development and Academic/Research workstream of the Atlantic ITS Strategic Planning effort. This organization assisted in efforts in information gathering, consultation and showcasing throughout the course of our work, and were an important participant in helping move this work forward. The group is expected to survive the completion of the strategic planning effort and provide ongoing guidance in the development of the Regional ITS base.

Appendix K lists the membership for the roundtable. Drawn from a variety of sources, including the overall stakeholder list, and the participants in the various Atlantic ITS Focus Groups, the group is somewhat larger than originally anticipated. Consisting of 17 individuals, the membership represents all four Atlantic Provinces, with 3 members from each of PEI and Newfoundland, 5 from Nova Scotia, and 6 from New Brunswick. Public sector participants are 6 in number, while the private sector has 8 members. One individual represents the academic sector and the "other" category consists of 1 representative each from an authority and a commission. The basis for the selection of this proposed membership is outlined below.

6.2.1 Basis for Selection of the Committee

A number of criteria were used to select the proposed roundtable membership:

- knowledgeable and interested individuals;
- important that the membership represent all four Atlantic Provinces;
- good mix of public and private sector participants, as well as other potential ITS user groups.

Private sector members with relevant technological capabilities and experience were specifically recruited, and – because of the economic development focus of the work – as effort was made to ensure representation from economic development agencies (EDA) in most of our provinces. In structuring the committee, the overall study approach was carefully considered to ensure a structure compatible with the market analysis (Section 6).

6.2.2 Role of the Committee

Roundtable members provided input and documentation review throughout the course of undertaking this work. Meetings were convened via teleconference, and some members participated in the Strategic Plan workshops. The sheer size and diversity of the group was an impediment to meeting in person, and this perhaps contributed to a lack of identity and cohesion for the group.

6.3 PAST RESEARCH

The Atlantic Region ITS Strategic Planning effort aims to develop a strategic vision and plan for the deployment of ITS technologies. The Economic Development and Academic/Research analysis is aimed directly at promoting the development of an industrial base within the region that can supply the technologies and personnel required for the deployment and ongoing support of ITS in Atlantic Canada. This section provides a synthesis on the state of ITS pertaining to:

- ITS in Atlantic Canada in terms of the region's characteristics and strengths, industry involvement and academic involvement;
- Past efforts at developing the ITS industrial and academic capabilities in the region;
- World projections for the ITS market;
- Potential sources of funding for ITS projects.

6.3.1 ITS Experience in Atlantic Canada

6.3.1.1 Characteristics and Strengths of the Region

In general, Atlantic Canada consists of small population centres that are geographically dispersed. The Atlantic Canada transportation network consists of highways (66,644 km of two-lane equivalent roads under federal, provincial and municipal jurisdiction[1]), airports (7 major airports and 12 local/regional airports), marine ports, ferry systems and railways. Atlantic Canada has several modes of transportation access to the rest of Canada and the U.S. As in the rest of Canada, most of the Atlantic Provinces area would be classified as rural, with pockets of urban areas.

The Canadian ITS architecture (http://www.its-sti.gc.ca) provides a framework for implementing ITS projects and ensure compatibility of the products and services across jurisdictions and systems. Defined in the architecture are the functions of various components and the relation between them. Also identified are the standards needed to guarantee that the ITS components will operate in a consistent and predictable way.

Described in the architecture, the services provided by ITS can be divided into eight major categories referred to as "user service bundles". The bundles are subdivided into 35 user services[*], which, in turn, are subdivided into 90 user sub-services. The user services and user sub-services provide increasing level of detail with regards to what the system will do from the perspective of the user, be it the travelling public or a system operator. "Market packages" identify groups of user sub-services that naturally relate to one another or are complimentary in nature.

In the Atlantic Provinces ITS Strategic Plan, 16 of 35 user services were identified as having a higher priority within the Atlantic Region based on the transportation system needs. These user services focused on emergency management, traveller information, traffic management, electronic payment, and commercial vehicle operations. The user services represented are not surprising given the characteristics of the region.

The Rural ITS Toolbox, recently published as part of U.S. Department of Transportation Rural Intelligent Transportation Systems (ITS) Program, identified seven Rural ITS Development Tracks defined in the Federal Highway Administration (FHWA) report Rural ITS User Needs[2]. Exhibit 6.2 illustrates that the user services identified under the Strategic Plan map well to the seven rural ITS development tracks.

Exhibit 6.2 – Comparison of Rural ITS Deployment Track with Priority User Services for Atlantic Canada

U.S. Rural ITS Development Track	Atlantic Priority User Services
Tourism and Travel Information	1.1 Traveller Information 1.4 Traveller Services and Reservation
Traffic Management	2.1 Traffic Control

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[*] User services document what ITS should do from the user's perspective. A broad range of users are considered, including the traveling public as well as many different types of system operators. The concept of user services allows system or project definition to begin by establishing the high level services that will be provided to address identified problems and needs. Some examples of user services from the Canadian ITS Architecture are: Incident Management, En-Route Transit Information, Intermodal Freight Management, etc.

U.S. Rural ITS Development Track	**Atlantic Priority User Services**
	2.2 Incident Management
Surface Transportation and Weather	2.4 Environmental Conditions Monitoring 8.1 Weather and Environmental Data Management
Operations and Maintenance	2.5 Operations and Maintenance
Crash Prevention and Security	2.6 Automated Warning and Enforcement
Rural Transit and Mobility	3.1 Public Transport Management
Commercial Vehicle Operations	4.1 Toll Roads, Parking and Transit 5.1 Commercial Vehicle Electronic Clearance 5.5 Intermodal Freight Management 5.6 Commercial Fleet Management
Emergency Services	6.1 Emergency Notification and Personal Safety 6.3 Disaster Response and Management 6.4 Emergency Vehicle Management

Geographically, the Atlantic Provinces have significant linkages with the U.S. market. In a recent survey of Atlantic Provinces business, 12% of sales were generated by the U.S.[3]. The survey population includes primary, secondary and service business with the secondary and service, businesses each representing 48.5% of the respondents. This distribution of respondents is representative of the economic activity in the region. Given the close relationship to the U.S. Rural ITS Development Track, there is a potential for the Atlantic Provinces to showcase rural ITS applications in their respective provinces and transfer them to markets in the U.S. and the rest of Canada.

Exhibit 6.3 summarizes future ITS initiatives, along with ITS experience to date for the Atlantic Provinces. This demonstrates the starting point for the development of an ITS Industrial Base. This information was compiled from a recent presentation prepared by the Regional ITS Planning Team, which included Nancy Lynch, Assistant Director Transportation Policy Branch NB DoT; Tom Beckett, Director of Policy and Planning NF DoWST; Peter M. Adams, Operations Engineer, District Operations Division NS DoTPW; and Cathy Worth, Planning Engineer, PEI DoTPW. The presentation was part of the proceedings of the Regional ITS Conference in 2000, as arranged by the Atlantic Provinces Transportation Commission.

Exhibit 6.3 – Atlantic Provinces ITS Initiatives and Experience

ITS Application	**Newfoundland**	**Prince Edward Island**	**Nova Scotia**	**New Brunswick**
Examining				
Advanced Roadside Weather Information System (ARWIS)	✓			
International border crossing clearance				✓

ITS Application	**Newfoundland**	**Prince Edward Island**	**Nova Scotia**	**New Brunswick**
Electronic clearance				✓
Weigh-in-motion (WIM*)	✓		✓	✓
Advanced Traveller Information Services (ATIS)			✓	✓
Commercial Vehicle Operations (CVO)	✓		✓	✓
Archived Data Management			✓	
Experience to Date				
Road closure/restriction information system				✓
Winter road conditions				✓
Traffic monitoring system				✓
Bridge ice warning system				✓
GIS-T highway inventory system				✓
ARWIS		✓	✓	✓
Truck mounted Infra Red (IR) Temperature Sensors				✓
Weigh-In-Motion (WIM)			✓	
Vehicle counter/classifiers	✓	✓	✓	✓
Texas weather instrument stations (WebCAMS)			✓	
Coordinated traffic signal control	✓	✓	✓	✓
SCOOT*			✓	
Shadow Tolling				✓

Canada and the U.S. have recently signed the Smart Corridor Border Declaration[4]. The declaration is a 30-point action plan, to collaborate in identifying and addressing security risks while efficiently and effectively expediting the legitimate flow of people and goods back and forth across the Canada-U.S. border. The declaration specifically identifies ITS deployment "*in support of other initiatives to facilitate the secure movement of goods and people, such as transponder applications and electronic container seals*".

Some initiatives can be announced that do not necessarily promote ITS investment directly. However, those in the industry can recognize the significant role for ITS in the announcement. For example, as part of its Action Plan for Regional Co-operation released on November 8, 2001, the Council of Atlantic Premiers released the following statement regarding a Harmonized Trucking Strategy for the Atlantic trade corridor.

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* WIM (Weigh-in-Motion) – WIM is a sensory technology that is capable of measuring the weight of a vehicle (typically used for Commercial Vehicle Operations) while in motion, thus saving the vehicle time and eliminating possible resulting congestion.

* SCOOT (Split Cycle Offset Optimization Technique) – SCOOT is a traffic control system that uses traffic adaptic control. Under traffic adaptive control, the system continuously monitors traffic flow and optimizes traffic signal operation based on an on-line traffic flow model.

"The development and implementation of a harmonized trucking strategy for the Atlantic Region will facilitate the efficient movement of goods to and from the Atlantic Region. The strategy will: contribute to increased trade corridor efficiency; improve the capability of regional and local transportation systems; improve coordination among provincial agencies; and facilitate the application of information technologies to the Atlantic transportation system to ensure the evolution of an "intelligent" Atlantic trade corridor."

The Harmonized Trucking Strategy Scoping Study was completed in June 2002.

6.3.1.2 Industry Involvement

In a report prepared for the Atlantic Canada Opportunities Agency, 20 firms were identified as working in the "intelligent systems" industry within Atlantic Canada[5]. That is not to say that these firms are working directly in the ITS industry, but rather have developed products and/or skills that are transferable to the ITS industry. For example, systems initially developed for the region's petroleum and ocean industries sectors can conceivably be adapted for transportation purposes. Exhibit 6.4 identifies a sample of the 20 firms listed in the Atlantic Canada Opportunities Agency report, provides a brief profile on the firm and identifies those with ITS experience.

Exhibit 6.4 – Profile of Atlantic Province Intelligent Systems Firms

Firm	Profile	ITS Experience
Newfoundland		
Canpolar East	• Canpolar East develops automation technologies, specializing in vision and tactile sensor systems software.	
C-CORE	• C-CORE is an applied R&D corporation for the resource industry. Expertise includes robotics, control systems, industrial automation, computer vision and intelligent sensing.	
Prince Edward Island		
Baseline Business Geographics	• Baseline Business Geographics specializes in providing integrated desktop and Internet mapping solutions for a broad range of applications for government, agriculture, health care, telecommunications, and fisheries research.	✓
GeoNet Technologies Inc.	• GeoNet Technologies specializes in GIS* applications ranging from the generation and structuring of geographical data for land and water to jurisdiction-wide programs such as property mapping.	

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* GIS (Geographic Information Systems) – GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information, i.e. data identified according to their locations.

Firm	Profile	ITS Experience
Nova Scotia		
Aliant Inc.	• Aliant is a group of advanced technology companies with strengths in telecommunications, information technology, mobile satellite communications and emerging business.	✓
Metocean	• Metocean is a manufacturing and development company for state-of-the-art data acquisition and telemetry systems for severe environments.	
Siemac Ltd.	• Seimac develops technology to provide tracking and status reporting for containers, trucks, wildlife, moorings, buoys and valuable goods anywhere in the world.	✓
Satlantic	• Satlantic designs, manufactures and operates a wide range of precision sensors, time-critical surveillance systems and advanced information extraction tools.	
EDIPort Atlantic	• EDIPort enables participation by small and medium-sized firms in electronic data interchange and dispatch/delivery functions for the Port of Halifax.	✓
Nova Scotia CAD/CAM Centre	• Nova Scotia CAD/CAM Centre was established between the Province of Nova Scotia and Dalhousie University to develop, design and utilize CAD/CAM applications.	
IMP Group International	• IMP specializes in aircraft engineering and maintenance, avionics and aerospace components.	
New Brunswick		
Approach Navigation Systems Inc.	• ANS provides general meteorological systems to measure any array of environmental parameters, which range in size from single-parameter systems to highly complex multi-station environmental networks.	
Advanced Business Services Ltd.	• ABS is a business solutions provider specializing in the delivery of software solutions to private and public sector organizations.	
CARIS Universal Systems	• CARIS is a supplier of Geographic Information Systems (GIS) and Spatial Information Management (SIM) solutions.	
LearnStream Inc.	• LearnStream is a custom courseware design firm.	
Trip Data and Safety Management Inc.	• TDSM provides safety consulting to the trucking industry, as wells on-board trip recording systems.	
Maritime Road Development Corporation	• Maritime Road Development Corporation designs, constructs and operates the Fredericton-Moncton highway Project for the New Brunswick DoT.	✓
Advanced Monitoring Technologies	• Advanced Monitoring Technology develops and implements monitoring and control systems for industrial and commercial applications.	

In addition to the firms listed in the above exhibit, the roundtable identified engineering consulting firms within the region with ITS experience. Examples include:

- Vaughan International Consultants Ltd. (Nova Scotia);
- Jacques Whitford (Nova Scotia);
- Geoplan Consultants Ltd. (New Brunswick).

As Exhibit 6.4 indicates, the review includes many firms which do not have direct ITS experience yet could conceivably participate in the industry through the transfer of relevant enabling technologies from other applications. While these lateral transfers are theoretically possible, and do in practice occur, the barriers can be significant. Many of the firms noted are small firms focusing on very specialized technology applications, often in the marine environment. While enabling technologies such as GIS and GPS[*] may be applied, the differences in the market in moving to the surface transportation industry can be very pronounced, and in many cases there may not be any particular technological or market advantage for the given firm. These opportunities to access the ITS market will be explored in greater detail under the subsequent tasks.

6.3.1.3 Academic Involvement

A recent survey of Canadian universities and colleges by Forest Integration Group Limited[6] identified schools with ITS curricula and research programs. The survey found that post secondary training in the ITS field is offered at several institutions throughout Canada. However, limited courses are offered at these institutions and there is no standardized approach to course curriculum.

Out of the twelve universities and six colleges located in the Atlantic Provinces, seven Universities and two colleges were contacted by the Forest Integration Group. The University of New Brunswick was the sole post secondary institution providing undergraduate and graduate courses on ITS. Dr. Eric Hildebrand, a professor in the Department of Civil Engineering at the University of New Brunswick, is active in the area of Road Weather Information Systems (RWIS)[^]. The department is also active with the Canadian Transportation Research Forum (CTRF), which is a voluntary group comprised of members of academic (including other Atlantic Province universities), government and business communities that examines all areas of transportation management and policy.

The New Brunswick Community College – Dieppe offers a Logistics and Transportation Management Techniques Co-op program. This program is designed for middle management personnel in the fields of logistics and transportation.

Two "Networks of Centres of Excellence", named Intelligent Sensing for Innovative Structures (ISIS) and Institute for Robotics and Intelligent Systems (IRIS) have established linkages between industry and academic. Dalhousie University is an ISIS node for Atlantic Canada and the University of New

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[*] GPS (Global Positioning System) – GPS is a system whereby a network of satellites is used to locate the longitude, latitude and altitude of the receiver. A minimum of three satellites must be in the scope of the receiver to function, with increasing accuracy as more satellites come into view.

[^] RWIS (Road Weather Information Systems) - Monitors current road and weather conditions using a combination of weather service information and data collected from environmental sensors deployed on and about the roadway. The collected road weather information is monitored and analysed to detect and forecast environmental hazards. This information can be used to more effectively deploy road maintenance resources, issue general traveller advisories, improve emergency management and response, and support location specific warnings to drivers.

Brunswick has been involved with ISIS projects. Furthermore Memorial University is an IRIS partner and the University of Prince Edward Island has been involved in IRIS projects. While the industries participating in the Networks of Centres of Excellence are not directly working in the ITS arena, they were identified as industries with skill sets transferable to the ITS industry[7].

As is evident from the experience of Canadian Universities, there is benefit in linking centres into networks for collaboration and information sharin This is particularly important in the face of the level of research and development expenditure that occurs through the universities and the National Laboratories in the United States. Through the National Laboratories such as Volpe and ITS Centres of Excellence, such as in Texas, millions of dollars of research monies are applied annually. To date, Canadian centres have not been active in linking into these U.S. to access these Networks of Centres of Excellence.

6.3.2 Past Efforts at Industrial Development

This section summarizes past studies and initiatives aimed at developing the industrial and academic capabilities within the region to support an ITS industry which will improve the economic competitiveness of the region. The literature reviewed provides both a national level scope from which we can draw an Atlantic perspective, or specifically for the Atlantic Provinces.

National Inventory of Intelligent Vehicle Highway Systems (IVHS) Programs and Related Activities in Canada[8]

This report developed an inventory of Canadian IVHS (ITS) programs completed, underway and planned. The objective was to use the national inventory to identify new research areas and document benefits from existing installations to foster the deployment of ITS. At the time of publication (December 31, 1994) Nova Scotia had 3 ITS projects either completed, active or planned in the areas of Advanced Traveller Information Systems (ATIS), Advanced Traffic Management Systems (ATMS) and Advanced Public Transportation Systems (APTS). The remaining Atlantic Provinces were not active in ITS at the time of publication. At the time, this represented 3 out of 167 projects within Canada.

The summary provided in Exhibit 6.3 demonstrates that ITS activity in Atlantic Canada has increased since this inventory was compiled.

Intelligent Transportation Systems in Canada: Current Priorities and Future Directions[9]

This paper identifies future directions for ITS development in Canada. Seven key action areas were identified, each with one or more action plan to develop Canadian capabilities in the field of ITS. These key actions include:

- Advocacy;
- Information dissemination;
- Enhancement of production factors;
- Promotion and fostering of industry;

- Research, Development & Deployment;
- Policy and decision making;
- Organizational coordinating structures.

Strategy for Developing an ITS Industrial Base in Canada[10]

This study was undertaken to facilitate the entry of Canadian companies into the ITS marketplace. An analysis of the Canadian ITS market revealed the following observations:

- Canada's world leading ITS companies are focused in CVO, electronic tolling, APTS and ATIS.
- Canada has world leading communication companies. Key communications technologies should be pursued and developed in support of ITS.
- Canada has strengths in key enabling technologies, including: GIS, displays, sensors, system integration and software, and positioning and navigation technologies.
- Canadian government is active in ITS at all levels. However, there is little coordination between jurisdictions, other than through ITS Canada.
- There is a need for a national-level government office to coordinate and work with Canadian ITS industries.
- The potential global ITS marketplace could reach U.S.$19 billion by 2001, U.S. $43 billion by 2006 and U.S. $66 billion by 2011. Canadian ITS industries could see global annual market sales of over U.S.$1.2 billion by 2001, U.S.$2.9 billion by 2006, and U.S.$4.7 billion by 2007.
- U.S. is a key market for Canadian ITS technology suppliers, with emerging industrialized countries in the Pacific Rim and Mexico/Latin America as a second major market.
- Lack of Canadian showcase projects limits Canadian industry offshore. Other countries have clearly demonstrated the need for government/industry partnerships for developing a strong ITS industrial base.

This work resulted in a series of recommendations for both the public sector and the private sector. Some recommendations, such as the establishment of a federal ITS office have been successfully applied. However it is noteworthy that a number of other key recommendations have not as of yet been acted upon. In particular, there has been little activity in developing partnerships among various levels of governments and the private sector to develop high profile showcase deployment projects, which have proved in the past to be very important for developing export markets, particularly in emerging markets.

ITS Universities and Colleges Output Study[11]

This project surveyed Canadian universities and colleges to identify schools with ITS curricula and research programs. In total 57 universities and colleges were contacted, with 41 responding to the survey. Results from the survey indicate that:

- Hotbeds for ITS training are emerging (e.g. Toronto and Montreal). Certain institutions have focused on aspects of ITS, such as safety or logistics likely due to research interest of senior department members.
- There is little consistency to the topics covered in programs covered at the various institutions either regionally or nationally.
- A governing body (i.e. ITS Canada) disseminating information regarding ITS research, training and deployment would help faculty on their own initiatives. An ITS Canada effort to develop interest in ITS in post-secondary institutions would be welcomed.
- Faculty interviewed did not have any sense of emerging demand for ITS professionals.

Study on ITS Applications within the Canadian Trucking Industry[12]

This report investigates the use of ITS in the motor carrier industry (CVO). The report provides an overview of ITS system and technologies applicable to the motor carrier industry, quantifies benefits to implementing CVO applications, assesses barriers to deployment, and estimates the potential for the industry if barriers are overcome. Main conclusions from the report applicable to this study include:

- Competition is driving the deployment of ITS-CVO applications, which is primarily limited to the large carriers.
- The roadside clearance network needs to be expanded in support of ITS-CVO/ATIS applications. Expansion of a roadside clearance system, and the addition of service functionalities would increase the enrolment of truckers.
- Future users will include the whole of the motor carrier industry, requiring participation from government regulatory agencies (e.g. provinces and the neighbouring states).

The experience of the North American market with large-scale corridor preclearance programs such as HELP, ADVANTAGE I-75/AVION, and NORPASS suggests that the level of subscription to these programs is not always met with expectations. This is an example where it is institutional considerations such as privacy concerns can become a significant barrier to widespread acceptance.

E-Commerce and the Canadian Trucking Industry[13]

The purpose of this study was to raise awareness of e-commerce and increase its adoption in the Canadian trucking industry. The study identifies barriers to e-commerce deployment as well as areas of future opportunity. The following briefly summarizes barrier to deployment:

- Customer readiness – the customer must be willing to adopt e-commerce as a method of doing business.

- Company preparedness – includes the knowledge of e-commerce, willingness of the industry and its ability to bear the cost of e-commerce, the readiness of the company's infrastructure, cooperation on e-commerce standards.

- Security issues –the security of both company and customer information is a concern. This is more of a perceived obstacle than a technical one.

Technology trends that may impact the trucking industry are:

- Wireless Web access;

- Speech recognition and natural language processing;

- Biometric identification;

- Electronic cash;

- Vehicle location and navigation technologies.

Much of the work under this program focuses on enabling the smaller scale, independent trucking organizations to access the electronic data interchange technologies employed by the larger organizations.

Intelligent Transportation Systems Economic Implications for Atlantic Canada[14]

A modest scan of Atlantic Canadian firms and research institutes developing intelligent systems was undertaken to assess the region's capabilities to compete on a world market. The objective is to assess the current state of the industry in order to identify factors required to develop the industrial capabilities within the region to support an ITS industry. Recommendations to further the development of the intelligent transportation systems industry in Atlantic Canada include:

- Federal and Provincial governments taking the lead public sector role in supporting Atlantic Canada ITS efforts.

- Establish an association similar to ITS Canada to interface between government and the ITS technology industry.

- Increased ITS awareness with the view of developing comprehensive deployment on a region-wide scale.

- Establish a forum for Atlantic Canada firms to showcase their expertise and gain insight on end-user requirements and solutions.

- Develop a test-bed in a specific area of ITS to develop expertise of Atlantic Canadian firms.

- Develop an ITS centre in Atlantic Canada to foster sharing and dissemination of information through cooperative research and development with firms, institutes and government.

Many of these recommendations are being acted upon and carried forward through the course of the ITS strategic planning exercise.

Report on Advancing Economic Cooperation in Atlantic Canada[15]

The purpose of this report was to survey industry and identify barriers to trade that restrict the movement of goods, services or persons within the region. The provinces were looking for feedback on the success of initiatives undertaken to date, which have proved successful for industry.

In a survey question respondents were asked to assess the importance of cooperation among provincial governments in improving the economic climate. Positive comments were received on the former Atlantic Provinces Telecommunication Council. The Atlantic Provinces Telecommunication Council along with government was instrumental in encouraging joint ventures among firms to develop the telecommunications industry within the Atlantic Provinces. This example may advance the roadmap for developing the ITS industry within the Atlantic Provinces.

Transport Canada – Deployment and Integration Plan (http://www.its-sti.gc.ca/en/its_deployment.htm)

The Government of Canada's Intelligent Transportation Systems (ITS) Plan sets out the federal government's strategy for stimulating the development and deployment of these systems across urban and rural Canada. The goals are to maximize the use and efficiency of existing infrastructure and meet future mobility needs more responsibly. The ITS Plan provides leadership and support to advance the application and compatibility of ITS technologies to make Canada's multimodal ground transportation system safe, integrated, efficient and sustainable. The Atlantic Provinces Strategic Planning Study and the St. John's Metrobus GPS project are part of this program. The ITS Plan outlines five pillars of activity:

1. Partnerships for knowledge – the essential building block;
2. Developing Canada's ITS architecture – a solid foundation;
3. A multimodal ITS research and development plan – fostering innovation;
4. Deployment and integration of ITS across Canada – moving forward;
5. Strengthening Canada's ITS industry – global leadership.

6.3.3 WORLD PROJECTIONS

The following is a small sample of market projects for the ITS industry from several resources. These projections reflect expectations of accelerated growth in spending as governments turn to ITS to help address transportation issues relating to safety, efficiency, and the environment.

- The following ITS market projections were described in the "ITS National Investment and Market Analysis"[16].

  - Over the next 20 years, the market for ITS products and services is expected to grow and cumulate to approximately $420 billion for the period, with the majority spent in developed markets (i.e. United States, Europe and the Pacific Rim).
  - Public infrastructure-driven markets in U.S. metropolitan areas are projected to exceed $80 billion cumulative over the next twenty years.
  - Private markets, including those for consumer and commercial driven ITS products and services, are estimated to exceed $340 billion cumulated over the next twenty years.

- The total U.S. consumer ITS market is expected to reach $27 billion (USD) by the year 2010[17].

- The total U.S. public led ITS market is expected to reach $35 billion (USD) and the total U.S. private sector ITS Market is expected to reach $318 billion (USD) by the year 2010[18].

- Technology market areas which are forecast to progress the most quickly are[19]:
  - Commercial vehicle operations in North America;
  - Advanced Traffic Management Services (ATMS) applications combined with Advanced Traveller Information Services (ATIS) in Japan;
  - ATMS applications oriented to traffic signal system adaptive control and coordination in Europe; and
  - Electronic toll collection.

The following are results from an Internet scan on world projects for the ITS industry.

- Transport Canada (http://www.its-sti.gc.ca/en/its_what_is_its.htm):
  - The annual world market for ITS is estimated to be $25 billion by 2001 and $90 billion by 2011.
  - The projected Canadian share of the global market is estimated at $1.2 billion by 2001 and $4.7 billion by 2011.

- A new analysis from Frost & Sullivan (http://transportation.frost.com/) states that the European market for intelligent transportation systems (ITS) comprising electronic toll collection systems (ETC), ATMS, and traffic information services (TIS) generated revenues of just under 1 billion Euros in 1997. Frost & Sullivan expects the market to more than double to 2.15 billion Euros by 2006.

- A recent U.S. Congress conference report earmarked $120 million (USD) for year 2002 ITS projects. Each state must match the Federal funding for their projects. The majority of the money is designated to specific states for statewide use, without describing specific projects. However, Vermont has allocated $1.5 million (USD) of its total $2.25 million (USD) in Federal funds for rural ITS projects.

6.3.4 ITS Funding Sources

Exhibit 6.5 presents potential sources of ITS project funding. While there are some funding programs specifically targeted to ITS, many funding opportunities arise from programs where ITS can provide an enabling or supporting role. Examples include programs directed at infrastructure development, environmental sustainability and industrial development.

Exhibit 6.5 – Potential Sources for ITS Project Funding

Organization/Fund	Description
Transport Canada	
Strategic Highways Infrastructure Program (SHIP) (http://www.tc.gc.ca/SHIP/menu.htm)	• In Budget 2000 the federal government announced that up to $600 million would be spent from 2002 to 2006 on highway construction and national system integration initiatives.
ITS Deployment and Integration Plan (http://www.its-sti.gc.ca/en/its_deployment.htm)	• Program funds (through SHIP) cost-shared ITS initiatives as part of the ITS Plan for Canada (Deployment and integration of ITS across Canada).
Moving On Sustainable Transportation (MOST) Program (http://www.tc.gc.ca/EnvAffairs/MOST/)	The MOST Program will provide funding to help support projects that will: • provide Canadians with practical information and tools to better understand sustainable transportation issues; • encourage the creation of innovative ways to promote sustainable transportation; • achieve quantifiable environmental and sustainable-development benefits.
Urban Transportation Showcase Program (http://www.tc.gc.ca/programs/environment/urbantransportation/)	Transport Canada will work in partnership with provinces and municipalities, to establish a number of transportation "showcases" in selected cities, for demonstrating and evaluating a range of urban transportation strategies within a broad planning framework.

Organization/Fund	Description
Freight Efficiency and Technology Initiative (http://www.tc.gc.ca/programs/environment/freighttransportation/menu.htm)	The five-year initiative is designed to reduce the growth of greenhouse gas (GHG) emissions from the freight transportation. It consists of the following three components: • demonstrating and encouraging the uptake of innovative technologies and efficient best practices within the freight transportation sector through the Freight Sustainability Demonstration Program; • soliciting the freight transportation industry's participation in emissions reduction initiatives through voluntary performance agreements; and • increasing fuel efficiency and environmental training and awareness amongst freight operators and shippers.
Climate Change (http://www.tc.gc.ca/programs/environment/climatechange/menu.htm)	Transport Canada will continue to work with other federal departments, provincial transport departments, municipal governments and the broader transportation community to seek partnerships, and implement measures to reduce GHG emissions.
Ministry of Finance	
CCRA Refundable Tax Credits	The Canada Customs and Revenue Agency offers small and medium sized Canadian controlled businesses a refundable tax credit.
Canada Infrastructure Program	
Physical Infrastructure Program (http://www.tbs-sct.gc.ca/ino-bni/Main/main_e.asp)	In partnership with provincial, territorial and local governments, First Nations and the private sector, Infrastructure Canada will help to renew and build infrastructure in rural and urban municipalities across Canada.
Strategic Infrastructure Program	Strategic investments are applied to key areas such as: • water & waste water • roads & transit • recreational areas & tourism • information technology
Industry Canada	
Lean Logistics Technology Roadmap (http://www.infochain.org/roadmap/LRTM_en.html)	Through the Technology Roadmap process, companies in the logistics sector can lever their resources and work with academia and governments to look into the future, in order to try to determine both where their specific market is going and the critical technologies that will be required. The development of the Logistics Technology Roadmap (LTRM) is overseen by a Steering Committee comprising of various working groups tasked with examining different areas of importance in the logistics sector. Industry Canada is providing resources to facilitate the development of the LTRM.

Organization/Fund	Description
Environment Canada	
Green Fund Climate Change Action Fund (CCAF) (http://www.climatechange.gc.ca/english/actions/action_fund/index.shtml)	The Climate Change Action Fund (CCAF) was established in 1998 by the federal government to help Canada meet its commitments under the Kyoto Protocol to reduce greenhouse gas emissions. Operation of the CCAF is based on a number of principles: • building where possible on existing initiatives and mechanisms; • leveraging and cost-sharing with the provinces and the private sector; • concrete milestones and demonstrable results; and • a transparent process that engages all relevant federal departments and agencies and external stakeholders.
National Research Council	
Industrial Research Assistance Program (IRAP) (http://www.nrc.ca/irap/home.html)	IRAP's mandate is to stimulate wealth-creation for Canada through technological innovation. Our mission is to stimulate innovation in Canadian small and medium-sized enterprises (SMEs).
Transportation Association of Canada (TAC)	
(http://tac-atc.ca/)	TAC is a non-profit association of transportation stakeholders in government, private industry, and educational institutions. It is a neutral forum for gathering or exchanging ideas, information and knowledge in support of technical guidelines and best practices. In the past TAC has funded ITS projects that have Canada-wide installation potential (e.g. ARWIS).
Atlantic Canada Opportunities Agency (ACOA)	
Atlantic Innovation Fund (AIF) (http://www.acoa.ca/e/financial/aif/index.shtml)	The Atlantic Innovation Fund (AIF) finances research and development and related initiatives in the areas of natural and applied sciences, and social sciences and humanities linked explicitly to the development of technology-based products, processes or services or their commercialization. The AIF strives to strengthen the region's system of innovation.
Business Development Program (BDP) (http://www.acoa.ca/e/financial/business.shtml)	This ACOA program is designed to help small and medium sized enterprises from most business sectors to modernize their business. The program offers access to capital in the form of interest-free, unsecured, repayable contributions. Non-profit organizations providing support to the business community may also qualify. Eligible activities include business studies, capital investment, training, marketing, quality assurance, and not-for-profit activities that support business in the region.
Provincial Governments	
New Brunswick Innovation Fund	The soon to be created New Brunswick Innovation Fund will receive an initial endowment of $20 million from the province for new research and development and innovation investment for New Brunswick. Details to be unveiled in the upcoming months.
Provincial Tax Credit Programs	The provincial governments offer tax credits for research and development firms within each province.

Organization/Fund	Description
U.S. Department of Transportation Federal Highway Administration	
TEA-21 – Coordinated Border Infrastructure Program (http://www.fhwa.dot.gov/tea21/)	TEA-21 authorizes the Federal surface transportation programs for highways, highway safety, and transit for the 6-year period 1998-2003. $140 million (USD) has been earmarked for the 2003 Coordinated Border Infrastructure Program. A focus of this program is on international coordination of planning, programming and border operation with Canada and Mexico relating to expediting cross border vehicle and cargo movements.
PRECARN	
IRIS (http://www.precarn.ca/IRIS/IRISLOI/)	The Institute for Robotics and Intelligent Systems (IRIS) is one of the Networks of Centres of Excellence (http://www.nce.gc.ca/) and has been in existence since 1990. IRIS is currently preparing its final application for NCE funding to take it to March 31st, 2005.
T-GAP (http://www.precarn.ca/iris/t-gap_(new).cfm)	The IRIS Research Management Committee has allocated funds—referred to as the Technology-Gap Assistance Program (T-GAP)—to advance technologies that show commercial promise. The T-GAP Program is intended to support six-month projects with funding in the range of $40,000 to $60,000 per project.
Regional Alliance Program (http://www.precarn.ca/PRECARNResearchProgram/alliance.cfm)	Precarn's Alliance Program is aimed to foster the development of intelligent systems technologies in small and medium sized companies across Canada. Under the Alliance Program, Precarn will partner with a regional organization to help fund R&D projects. The Alliance Program is an important means of extending Precarn's reach into all regions of Canada.

6.3.5 SUMMARY

World projections for the ITS market are promising, but vary widely. Transport Canada estimates the annual world market for ITS to be $90 billion by 2011, and the Canadian share of this global market at $4.7 billion.

Atlantic Canada consists of small population centres that are geographically dispersed. Most of the Atlantic Provinces would be classified as rural, with pockets of urban areas. Atlantic Canada has several modes of transportation access to the rest of Canada and the U.S.

In the User Services Plan developed under the Strategic Plan, sixteen user services were identified as having a higher priority within the Atlantic Region. These user services map well to the seven rural ITS development tracks developed by the FHWA, which is not surprising given the characteristics of the region. The exception is the user services identified focusing on toll and commercial vehicle operations.

The Atlantic Provinces ITS initiatives and experience to date cut across several ITS user services, but tend to focus on rural applications and commercial vehicle operations. This work supports the sixteen user services identified in the Strategic Plan. A statement from the Council of Atlantic Premiers further reinforces the importance of commercial vehicle operations in the region.

A scan of Atlantic Canada firms working in the "intelligent systems" industry identified 20 firms that could potentially compete in the ITS market. These firms, primarily involved in related areas of information technology, could shift their business activity to include transportation applications, and transfer their knowledge and experience to develop and provide ITS solutions. While these lateral transfers are theoretically possible, the barriers can be significant. These opportunities to access the ITS market will be explored in greater detail under the subsequent sections.

Post secondary training in the ITS field (or a closely related field) is offered at the University of New Brunswick, New Brunswick Community College, Dalhousie University, Memorial University and the University of Prince Edward Island. The development of ITS curriculum at these institutions, as part of a national effort, would provide the necessary human resources to industry. Given the level of research and development expenditure that occurs through the universities and the national laboratories in the United States, there is benefit in linking centres into networks for collaboration and information sharing.

Past studies and initiatives undertaken to develop the industrial and academic capabilities to support an ITS industry were undertaken, most notably, by Transport Canada. These projects typically involved partnerships with other levels of government, as well as the private sector. Ongoing Transport Canada initiatives pave the way for potential funding sources for ITS projects within the region (i.e. ITS Deployment and Integration Plan, Urban Transportation Showcase Program).

To date, previous studies have evaluated the ITS industry in the Atlantic Provinces and in some cases have made recommendations to promote ITS. However, the studies have not provided a specific strategic approach to increase ITS deployment in the Atlantic Provinces. The intent of this Atlantic Provinces Regional ITS Strategic Planning Study is to develop the appropriate initiatives as part of a coordinated plan.

6.4 ITS CAPABILITIES INVENTORY

This section presents an inventory of the capabilities of businesses and academic institutions in the Atlantic Provinces with respect to the development, implementation, and export of Intelligent Transportation Systems (ITS) and related technology. The inventory represents a profile of the existing ITS industrial and research/academic presence in the region, with an indication of potential latent capabilities drawn from related industries. This information serves as input to the subsequent effort in case study analysis and showcasing regional ITS capabilities.

The objectives underlying the generation of this inventory include the following:

- To promote an understanding of the capabilities of regional businesses currently or potentially involved in ITS, both individually and as a group.
- To facilitate potential roles for resident businesses in the implementation of ITS within the Atlantic Region.
- To provide a guide to capabilities that will allow businesses to identify candidates for strategic alliances and other working relationships to assist them in achieving their corporate goals.

- To assist in identifying economic development opportunities with respect to the export of regional expertise and technology to growing national and international ITS markets.

6.4.1 What Businesses and Organizations are Included in This Inventory?

To be individually profiled in the inventory, the ITS Atlantic Roundtable agreed to include businesses that adhere to the following criteria:

- The products and/or services provided relate to the following groups of enabling technologies which represent core inputs to the development and implementation of ITS initiatives:
  - sensing, monitoring, surveillance, and data-logging systems, both on-board and infrastructure-based;
  - position determination, navigation, and routing technologies;
  - transportation control systems, including control hardware (signs, signals, etc.) and software (algorithms, intelligent software agents, etc.);
  - user interfaces for drivers, travellers, and transportation system operators;
  - electronic payment technologies related to transportation;
  - information communication, management, and analysis related to the above technology groups or to transportation in general; and,
  - consulting services, including the planning, evaluation, integration, and design of intelligent systems, as well as of transportation systems in a more general sense.

Many of these businesses also had communications and information technology components. It was not considered necessary that the business be involved directly in ITS at the present time; capabilities potentially transferable to ITS were also recognized. It is important to note that many of the technologies and capabilities required to implement those intelligent transportation systems now in existence around the world were adapted from other areas such as defence and aerospace. Other criteria include:

- The business is based in Atlantic Canada. This excluded a number of significant companies, such as AMEC and MacDonald Detweiler, who have branch offices in Atlantic Canada but are headquartered elsewhere, unless they are deemed to be significant contributors to ITS and economic development in the region.
- The business is export-oriented, focussed on accessing the North American and/or international markets.

Businesses not profiled individually but dealt with in more general terms in later sections of the report include communication system developers and service providers, companies dealing more generally with information technology, companies dealing principally with courseware and training, and companies primarily involved in sales, installation, and maintenance activities. Out of a group of companies specializing in geomatics[*], only a few were profiled, those having known experience with transportation-related applications. Academic institutions, technology associations, and public sector entities are also dealt with from a more general perspective.

It is acknowledged that this inventory is probably not exhaustive. Businesses are starting up, changing, or ceasing operations on an ongoing basis. However, it is believed to be quite comprehensive and illustrative of the range of capabilities resident in Atlantic Canada at the present time.

6.4.2 How the Capabilities Inventory was Created

An initial list of candidate businesses was generated from information provided by previous ITS inventory efforts, the study Roundtable, business associations, and information technology associations. This list was augmented through a review of Industry Canada's Strategis database of Canadian company capabilities and through the capabilities inventory recently developed for the defence and aerospace sectors in New Brunswick. A number of additional candidates were identified throughout the process during the course of discussions with the Steering Committee, ITS Working Group, and business representatives.

For each company, a sense of the business products and services was obtained through examination of the company profiles in the Strategis database and perusal of the individual business' websites. Each of the companies identified as a possible candidate was sent an e-mail outlining the purpose of the inventory and the information being sought as input to the profiles, and providing background information on ITS and the range of enabling technologies involved. It was intended that this information would assist individual businesses in assessing how their products or services might be relevant. Telephone contact was made with an appropriate representative of each candidate business. During the course of the discussion, the relevance of the company's goods and services to ITS was assessed and the information required for the profile was compiled. The majority of the interactions with the companies occurred in early 2002.

The company's affiliation with technology 'clusters' or industry associations and the nature and extent of their working relationships with other companies was also explored during the discussion. However, this information was not judged to be sufficiently complete in many cases or was of a proprietary nature and as such is discussed in general terms in the following sections rather than being included in the individual profiles.

6.4.3 An Assessment of ITS Capabilities in Atlantic Canada

6.4.3.1 Overview of the Profiled Companies

Exhibit 6.6 describes the types of services currently provided by the companies profiled in this inventory. For each firm, the primary office presence within the region is indicated; many firms have other office presence throughout the region.

Appendix L outlines the ITS capabilities of the profiled companies in the context of major categories of enabling technologies. The individual profiles are contained in Appendix M.

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[*] Geomatics encompasses the science, technology and management of geographically referenced information, including its acquisition, storage, analysis, processing, display and dissemination.

Information available in the profiles includes:

- Contact information;
- The company's presence in Atlantic Canada and its principal business activities or roles;
- The products and services of the business that are directly related to or that are potentially adaptable to ITS; and
- The geographic distribution of the company's existing market.

There may be other companies with enabling technologies such as touch-screen kiosk applications which may be relevant within the ITS arena. It is important that this study effort provide the products to raise awareness and interest in ITS opportunities, and insight into the potential courses of action to access the market. Note that the list of companies is not necessarily exhaustive, and is not intended to exclude any firms.

Exhibit 6.6 – Summary of Current Products and Services of Profiled ITS-Capable Companies

Company	Principal Location	Description of Products/Services
Accesstec Inc.	NB	Integrated wireless parking information/enforcement systems.
ADI Group	NB	Transportation planning and engineering consulting services.
Advatek Systems Inc.	NB	RFID system for monitoring and tracking, weighing systems.
ALT Group Inc	NB	Wireless commercial vehicle fuel tax reporting system.
AMIRIX Systems Inc.	NS	Asset tracking system, custom embedded hardware and related software.
AnyWare Group Inc.	NB	Transponder/smart card-based billing system.
Approach Navigation Systems Inc.	NB	RWIS, aviation weather and navigation.
Atlantic Data Group	NS	Intelligent video surveillance systems.
Baseline Business Geographics Inc.	PE	GIS-based RF network planning, transportation routing/scheduling.
Beltek Systems Design Inc.	NB	Commercial vehicle route accounting, safety compliance monitoring.
Canpolar East Inc.	NF	Sensors including automobile occupant and crash sensors.
CARIS	NB	GIS/GPS-based tracking and routing systems.
C-CORE	NF	Remote sensing/surveillance systems.
Centre for Education & Research in Safety	NB	Programs to improve the safety behaviour of motorists, cyclists and pedestrians.
Compusult Limited	NF	Asset tracking systems.
Consolidated Technologies Ltd.	NF	Custom embedded data interfaces.
Delphi Systems	NS	ITS consulting (planning, evaluation, training).
DPL Group	NB	Asset tracking, remote data monitoring systems.
Engineering Technologies Canada Ltd.	PE	Intelligent sensors, custom microelectronics, consulting on user interfaces.
Enseignes Imperial Signs	NB	Electronic signs, message centres.
GeoNet Technologies Inc.	PE	GIS-based routing, 911-related civic addressing, off-line highway information.
Geoplan Consultants Inc.	NB	GIS-based 911-related civic addressing.
International Communications and Navigation Ltd.	NF	Marine navigation, security, surveillance, and tracking systems.
Intrignia Solutions Inc.	NF	Intelligent and automated mining and marine systems.
Jack McGraw Consulting Inc.	NS	Development and operation of radio services
J.J. Mackay Canada Limited	NS	Intelligent parking meters, enforcement, audit, smart-card capable

Company	Principal Location	Description of Products/Services
Kinek Ltd.	NB	Commercial delivery management and optimization.
Measurand Inc.	NB	Shape sensor alternative to accelerometers.
PEI Innovations Inc.	PE	Product handling/damage sensors and data-logging.
Pintér Consulting	NS	Modelling and optimization tools.
Satlantic Inc.	NS	Remote sensing/surveillance, data fusion and transmission, power management.
Seimac Limited	NS	Asset tracking, weather forecasting, telemetry, satcomm transmitters
SGE Group Inc.	NF	Advanced transportation management and information systems.
Spatial Decision Support Systems	PE	Bus routing and optimization.
SVG Consulting Inc.	NB	ITS consulting – policy, planning, evaluation, training.
Trip Data & Safety Management Inc.	NB	Commercial driver safety and vehicle status logging
Jacques Whitford Environment	NS	Infrastructure condition evaluation and management.
xwave	NS	Police mobile data support, emergency services dispatching, asset tracking, parking enforcement management, data fusion

The majority of companies contacted did not have direct experience with obvious ITS applications. This is not surprising since ITS implementation is in a state of relative infancy in Atlantic Canada. However, the range of capabilities with respect to technologies applicable or adaptable to ITS suggests a potential for greater involvement contingent upon suitable market opportunities, both domestic and international. Most of the firms contacted expressed a cautious interest in adapting their technology to ITS. No specific barriers to such technology transfers were noted, however, diversification of this nature, beyond existing core business activities, would invariably be contingent upon a sufficiently large market to make it financially and practically worthwhile. The availability of any necessary working relationships with complementary companies or organizations would be critical.

The companies profiled ranged from those specialized in a particular niche, such as specific types of sensors or specific software applications, to those who acted as systems integrators, assembling packages of hardware and software components into turnkey systems.

The following sections cover more specific aspects of the companies profiled, as well as documenting companies and organizations which, although not profiled, provide goods and services which would be supportive of ITS development and implementation in Atlantic Canada.

6.4.4 Core ITS Capability 'Clusters'

A review of the profiled companies indicates that most of them can be grouped into several functional clusters analogous to the categories of enabling technologies reflected in Appendix N. It is apparent that certain clusters directly relevant to ITS have a well-developed presence in Atlantic Canada, namely information technology, sensors and surveillance, and geomatics (including location determination and tracking). It is beyond the scope of this study to examine the reasons for the dominance of these particular clusters in the Atlantic Region, but the reasons likely include the following:

- Characteristics of local market location: for example, the sensor/surveillance cluster is oriented to the marine environment, likely in response to offshore oil, fishing, and shipping activities and requirements;

- The ability to operate at a distance from the broader market combined with quality of life considerations: for example, the information technology cluster including distance learning and training;
- Promotion and support from the provincial governments: for example, the information technology cluster;
- The availability of supporting functions such as centres of excellence, incubators/accelerators, and industry associations: again, for example, the information technology cluster;
- Working relationships with key academic institutions such as the University of New Brunswick which maintains targeted technology programs. The integrated research of the computer science and survey engineering faculties has led to the emergence of New Brunswick's excellence in geomatics.

The following discussion applies primarily to technology developed and, in some cases, produced by the companies under consideration. There is a broader base of ITS-applicable experience related to technology that is out-sourced with respect to manufacturing but integrated into turnkey systems by companies in Atlantic Canada.

Information Technology

The information technology clusters are formally represented through the IT associations in each province. Appendix N provides company listings for each provincial association. Through these formal associations, and the Information Technology Association of Canada (ITAC), the industry can represent itself to industry and government to achieve a number of objectives including promoting the profile and capabilities of the industry, and promoting information sharing and networking among members and potential customers. The IT sector has grown to be very broad, encompassing a range of applications. Within the sector, any given subset of organizations specializing in a particular area, such as asset management or supply chain management, may form ad hoc partnerships on a project-by-project basis in order to provide the complete software and hardware to deliver an application.

Many of the firms profiled develop their own software. In some cases this is marketed as a stand-alone product; in others it is integrated with hardware components (often out-sourced) to create turnkey systems. A wide range of information systems is represented among the products and services of the profiled companies. These include systems with potential ITS applicability related to asset tracking, fleet management and administration, parking management and enforcement, police support, weather forecasting, infrastructure condition monitoring and management, and data fusion. In addition to the companies actually profiled with software that is most closely related to ITS, there is a significant number of more generic software companies that could potentially offer software development support.

The IT cluster is very important when considering the development of the ITS industry within the region. Often the development of new software applications is the most readily accessible means for a new entrant to the ITS market. The typical model will involve a small start-up enterprise, often working in conjunction with an academic institution such as UNB, delivering a given project application which can subsequently be marketed elsewhere.

Sensors and Surveillance Systems

ITS applications are typically sensory intensive. In many cases, infrastructure based sensors and vehicle on-board sensors draw upon technologies developed from other industries. For example, optical character recognition technology used for automated license plate reading and toll road enforcement applications is drawn from the manufacturing process control industry.

A significant number of the profiled companies produce sensors and surveillance systems. One significant 'sub-cluster' involves oceanographic sensors, some of which have potential ITS applicability, particularly in the area of road weather information systems (RWIS). Other sensors range from those related to product handling, with potential applicability to cargo status monitoring, to those designed for occupant detection and safety systems activation in automobiles. Also represented are video-based surveillance systems which are potentially applicable to traffic surveillance and traveller security systems, and custom sensor micro-electronics. The related experience that many of these firms have accumulated with respect to telemetry, data fusion, data analysis, and power management is readily transferable to ITS.

Geomatics

The geomatics cluster is an area of strength for Atlantic industry and academia, well recognized beyond the borders of the region. The cluster incorporates a broad cross section of local start-up enterprises, presence of multi-national corporations, and linkages to targeted programs at academic institutions such as UNB and Memorial University Newfoundland (MUN). Much of the industrial focus is on marine applications for the resource industry, search and rescue, defence, etc.

This cluster includes companies that utilize geographic information systems (GIS) and global positioning systems (GPS) to provide positioning, tracking, routing, mapping, and other analytical services. There is a formal geomatics cluster, represented by the Champlain Institute, which includes nine geomatics companies located in New Brunswick, Nova Scotia, and Prince Edward Island. A few of these were profiled based on their previous experience with transportation-related applications. The MacDonnell Group, based in Halifax, also represents companies that provide services in the field of geomatics. Appendix O identifies the companies with these organizations.

There are also several companies, outside these more formal arrangements, that provide geomatics-related systems, primarily in the area of commercial fleet management and asset tracking. The experience represented by the companies in this cluster is potentially transferable to commercial vehicle and public transit fleet management, intermodal terminal operations, on-board navigation systems, emergency vehicle dispatching and routing, communications network planning, and rural mayday systems, to name a few.

6.4.4.1 Other ITS Capabilities

Outside of the obvious clusters described above, there are other areas of potential applicability to ITS represented by one or a few firms in each case.

General Transportation-Related Consulting Services

There are several firms in Atlantic Canada that provide transportation consulting services both related to ITS and of a more general nature related to policy, planning, evaluation, and operations. The experience of these companies would be valuable in conjunction with information technology or other companies who may not have experience with respect to ITS and, more generally, transportation and transportation issues. These companies tend to serve a market more focused on the Atlantic Region, rather than international markets.

Electronic Payment Systems and Devices

Electronic payment systems developed by the profiled companies include smart-card or internet-based billing engines applicable to a variety of ITS applications including traveller reservations and payment for accommodations, events, ferry services and tolled roads and bridges. Also represented are 'intelligent' parking meters and pay-and-display systems that accept smart cards, can be programmed to implement different parking pricing strategies and in some cases offer wireless transmittal of payment and usage information. There are a number of possible enhancements to these systems that would increase their value from an ITS perspective but actual development and implementation would be dependent upon market opportunities.

Control Systems

Several companies have experience with control algorithms and one firm in particular produces variable message signs applicable to ITS. There have been successful examples in the region of the transfer of automated command and control technology from the marine environment to other applications, namely mining automation and process control.

User Interfaces

Only a limited selection of user interface technologies have been developed and are being produced in Atlantic Canada. Selected firms have experience in kiosks and touch screen displays for applications such as parking payment.

Multi-disciplinary Networks

In addition to the Champlain Institute and the MacDonnell Group, which are examples of "niche" clusters, the Northstar Network is an example of a formal, private-sector, multi-disciplinary cluster that facilitates access to its members and leverages their promotion initiatives. Companies belonging to this cluster represent a range of defence, aerospace, and marine capabilities potentially applicable to ITS. Appendix O identifies companies currently belonging to these clusters.

6.4.4.2 Clusters of Supporting Technologies and Services

Although companies and organizations in this category were not profiled individually, it is worthwhile noting the presence of a variety of core capabilities in the Atlantic Region that would be supportive of ITS implementation. Some of these can be considered as clusters as follows:

Courseware and e-learning

The Atlantic Region is internationally recognized for the development of core competencies in courseware and e-learning applications. These competencies can support a broad range of distance learning services for a range of applications. In New Brunswick alone, the industry has provided on-line training services for over two million people, representing an investment of over $80 million. The bilingual capabilities of the industry have been a key asset.

Courseware and e-learning industrial strengths can provide a supporting role to the ITS industry. Specific areas of activity include:

- Driving simulators for passenger vehicles or specialty vehicles such as snow ploughs in order to analyze the human factors considerations associated with new technology applications.
- Operator training for various operations centre applications, including traffic management and incident management.
- Emergency services dispatch.
- Commercial fleet management/dispatch.
- Toll collection and revenue management.

Customer Contact Centres

There is a significant presence of customer contact centres in Atlantic Canada, providing voice and web based support services for many large multi-national corporations and public sector entities. New Brunswick and Nova Scotia have a particularly strong presence in this industry. Once again, the bilingual capability is seen as an asset for the industry. The supporting services, products and applications associated with this industry are a relevant supporting service for the ITS industry. With the ever increasing level of deployment particularly in the U.S. market, the focus of ITS applications is increasingly the management of real-time information. Examples include:

- Incident reporting/management;
- Regional traffic control;
- Advanced traveller information systems;
- Emergency services management;
- Fleet management.

Translation

A significant translation service industry cluster has emerged in New Brunswick. The industry extends beyond Canada's two official languages. This cluster is relevant to the ITS industry in order to support engineering services documentation, manuals, training documentation, and system user interfaces as North America's ITS industry expands into emerging markets, particularly Latin America.

Information Technology

As mentioned previously, there is a large number of information technology companies in Atlantic Canada that are not currently oriented to ITS-type applications. However, with the right working relationships, there is no reason why these more generic firms cannot play a role in ITS development.

Telecommunications

Some of the companies profiled include a communications component in their offerings, often through a working relationship with a communications service provider. There are a number of businesses dealing strictly with communications services and equipment that could contribute that component to a consortium assembling an ITS initiative.

6.4.4.3 Research/Academic Capabilities

Several of the profiled companies mentioned collaboration with Atlantic Region universities and colleges. There are a variety of technology-oriented programs at Atlantic Canada universities and colleges, with programs/activities which are either directly related to ITS, or incorporate technologies and applications transferable to the ITS industry.

University of New Brunswick

The University of New Brunswick (UNB) Department of Civil Engineering includes a transportation group established in 1967. The group presently incorporates a graduate studies research unit with a Masters and PhD program involving the participation of seven faculty members. There are typically up to ten full time and many part-time, graduate students. In addition, transportation undergrad courses are offered as part of the standard civil engineering program. Specific ITS elements within the curriculum include:

- Graduate Levels – Explicit course on ITS, and ITS components within the road safety engineering course.

- Undergrad Level – ITS components in the core introduction to transportation engineering, and within the final year elective on traffic engineering.

Other programs at UNB relevant to ITS include the Department of Geodessey and Geomatics, the Department of Computer Science, and the Department of Electrical and Computer Engineering.

The transportation group undertakes various ITS related research activities. The collision research team has worked for over twenty years with seven other universities across Canada and the Road Safety Directorate at Transport Canada in undertaking directed studies for specific types of collisions. The team is currently analyzing the impact of advanced safety technologies including side airbags, side curtains, and seat belt pre-tensioners. ITS related graduate student research projects have included:

- work zone speed control;

- heavy truck stability;

- micro simulation to optimize urban traffic control.

The transportation group has participated in a number of partnerships and networks including:

- Undergrad research projects funded by 3M Canada.
- The Economic Industrial Benefits Program with Maritime Road Development Corporation (MRDC).

New Brunswick Community College, Dieppe Campus

New Brunswick Community College (NBCC) offers a course in logistics and transportation management techniques. This is a three year program encompassing roughly forty students with a successful record of 100% placement in the freight and manufacturing industries. NBCC actively markets the program in order to recruit candidates to meet demand in the workplace. The program has a significant technology focus reflecting the impact of information technology on supply chain management and goods movement operations.

NBCC is currently seeking partners for a proposed program, the Transportation and Logistics Institute for the Atlantic Region. This program is envisaged as a separate bilingual entity linked to the college but able to readily work with private sector interests on research and development initiatives.

Memorial University, Newfoundland

The Memorial University, Newfoundland (MUN) Faculty of Engineering and Applied Sciences operates a number of technology oriented programs, focussed on the marine environment. Some of these programs would involve applications and technologies which are transferable to industrial automation and conceivably the ITS industry. Specifically, the Instrumentation Control and Automation Laboratory is involved in autonomous control for aircraft and marine vessels, primarily targeting the resource industry. Applications from this program have been transferred to other environments such as mining automation. The faculty is active in developing mechanisms for liaison with industry and collaborative research programs, such as the Ocean Research Centre.

Mount Saint Vincent University

The Psychology Department at Mount Saint Vincent University in Halifax has been actively involved in human factors applications in transportation. Activities have involved participation in ITS initiatives to facilitate traffic and pedestrian safety, traffic calming, and reduced impaired driving. Specific areas of research and publication have included advancements in pedestrian signal displays and signal phasing.

Dalhousie University

The Civil Engineering Department at Dalhousie University does address ITS in undergraduate transportation courses. A graduate course in ITS is being contemplated, and there has been some post-graduate activity in expert systems for ITS applications. As a member of the Consortium for ITS Training & Education (CITE), the Civil Engineering Department is able to offer some CITE courses to its students.

Recent faculty research has focused in the area of ITS architecture. A Ph.D. thesis in this field titled "Satellitic Automated Highway System: Visual Modelling of the Requirements Using Rational Rose and UML" had two main objectives:

- To provide the Intelligent Transportation System of Canada (ITSC) with a stable and flexible architecture based on object-oriented methodology; and
- To integrate the backup communication concept with the new ITSC architecture, which will enhance reliability and dependability of systems that will be developed based on the architecture.

Faculty in the Department of Electrical Engineering are active researchers in areas of communication – a key component of any ITS system.

Research Centres

There are a number of collaborative research centres in the Atlantic Region that provide research, development, and testing services to assist in the technological innovation process. Examples include the Research and Productivity Council (RPC), Concept + Inc. (Genieo), and the Electronic Commerce Centre (affiliated with the University of New Brunswick), all located in New Brunswick.

The National Research Council (NRC) is currently initiating the Institute for Information Technology (IIT) – Atlantic as part of its national ITT. This will initially involve the following four research facilities intended to support growing, locally-driven information technology clusters in Atlantic Canada:

- an Atlantic "hub" facility in Fredericton, New Brunswick;
- a facility in Moncton, New Brunswick, focusing on e-learning;
- a facility in Saint John, New Brunswick, focusing on customer behaviour in relation to e-business service delivery; and
- a facility in Sydney, Nova Scotia, focusing on wireless networking.

The initiation of these facilities is now underway. Other potential research topics have been and are continuing to be considered, including:

- voice recognition;
- security, trust and privacy related to e-business;
- decision support for e-business;
- multi-agent systems for e-business; and,
- voice interaction portal for mobile internet use.

6.4.4.4 Industry Support Services

The following organizations and institutions could also provide support to ITS implementation or the development of an ITS commercial and industrial base. This support might take the form of collaborative research, start-up support for new companies, or assisting in the formation of strategic alliances and other working relationships.

Incubator/Accelerator Companies

Incubator/accelerator companies, set up to provide business start-up facilities, training, mentoring, and related services, may be found throughout the Atlantic Region. Some also promote technology transfer from higher-level academic institutions.

These include:

- Centre of Excellence in Information Technology (New Brunswick)
- Incutech Brunswick Inc. (New Brunswick)
- Licensing Lab (New Brunswick)
- Miratech Inc. (New Brunswick)
- Crown of the Valley Development Corporation/Venture Centre (Newfoundland and Labrador)
- Excite Corporation/Exploits Centre for Information Technology Excellence (Newfoundland and Labrador)
- Genesis Centre (Memorial University of Newfoundland)
- InNOVAcorp/Technology Innovation Centre (Nova Scotia)
- Technology Enterprise Centre (Nova Scotia)
- TechPEI/Atlantic Technology Centre (Prince Edward Island)

Industry Associations

A number of public and private sector organizations, typically pursuing economic development objectives, facilitate collaboration among their members and promote the identity and interests of the information technology industry, an essential contributor to ITS initiatives.

These include:

- Premier's Roundtable on eNB and Innovation in New Brunswick

- Newfoundland & Labrador Association of Technology Industries (NATI)
- Canadian Centre for Marine Communications (CCMC) in Newfoundland and Labrador
- Information Technology Industry Alliance of Nova Scotia (ITANS)
- NovaKnowledge in Nova Scotia
- Information Technologies Association of Prince Edward Island (ITAP)
- Technology PEI (TechPEI) in Prince Edward Island

Several of these are affiliated with the Information Technology Association of Canada (ITAC). In addition, Business New Brunswick is involved in the formation of a new information technology association to replace a previous association, no longer in existence and has also launched a capabilities inventory for the aerospace and defence industries which may have applicability for ITS. It is worth noting again, in this context, that a significant part of the technology involved in existing ITS applications around the world evolved from defence and aerospace research and development.

Appendix N provides a list of information technology and related companies based on the membership lists for NATI, ITANS, ITAP, and Business New Brunswick and on other inputs received during the course of the study. Limited editing has been undertaken to remove public sector agencies and departments and companies obviously not ITS-related.

6.4.4.5 Company Roles – Niche-Oriented Businesses vs. Integrators

The profiled companies include niche-oriented companies that specialize in one or a small number of related software or hardware products which stand-alone or will be incorporated by other companies in more comprehensive systems. Companies may also assume the role of system integrator, companies that typically package their own software or hardware with additional, out-sourced components and communications services to provide a turnkey system for a given application.

The predominant focus among the profiled companies is on product research and development and system integration. A number of the companies also offer consulting and training support for their products and systems. Although some companies produce the hardware for their products, many systems employ out-sourced hardware components.

6.4.4.6 Alliances and Working Relationships

Very few of the profiled companies indicated that they were completely self-contained and operated independently of other companies or organizations. The vast majority reported that they were involved in one or more alliances or working relationships with other companies and organizations.

Some of the more common forms of working relationships reported included the following:

- 'Integrators' obtaining complementary hardware or software components, or communications or other services, as needed to complete their system, through out-sourcing;

- Companies acting as marketing and sales agents for other companies with complementary products or services. Often done reciprocally, as this increases market reach;
- Companies 'adding value' and 're-selling' other companies products, the added value often being a new or enhanced software-based capability;
- Companies contracting with other companies to obtain specialized services such as geomatics, call-centre, training and courseware, or similar;
- Membership in industry associations to increase visibility;
- Collaboration with academic institutions or centres of excellence, mainly for research purposes.

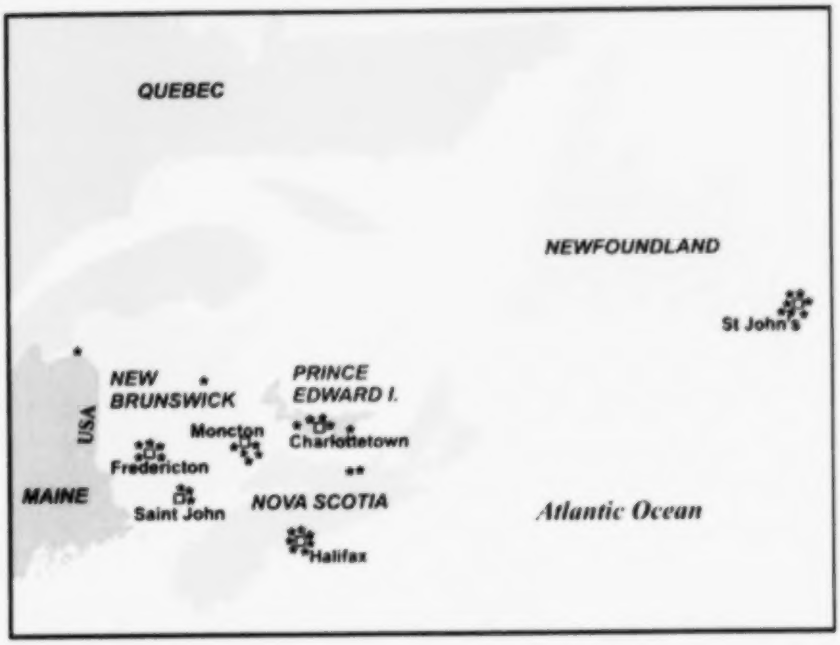
6.4.4.7 Characteristics of the Profiled Companies

Although there do not appear to be any predominant patterns, some commentary on the characteristics of the profiled companies is in order.

Geographic Distribution

Exhibit 6.7 shows the geographic distribution of the principal locations of the profiled companies. All of the Atlantic Provinces are represented in this group. Some firms, for example those involved with oceanographic sensors and other marine systems, are located close to their largest market in Newfoundland. Most are concentrated in and around the principal urban areas of Fredericton, Saint John, and Moncton, New Brunswick; St. John's, Newfoundland and Labrador; Halifax-Dartmouth, Nova Scotia; and Charlottetown, Prince Edward Island. Several of the companies have located in smaller communities, presumably for quality-of-life reasons and low overhead costs.

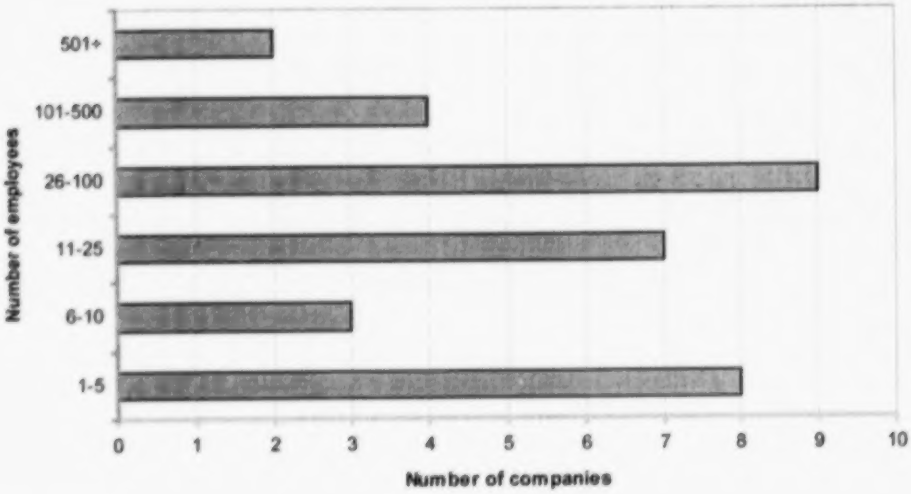
Exhibit 6.7 – Geographic Distribution of Profiled Companies



Company Size

A range of company sizes is represented by the profiled companies as shown in Exhibit 6.8. About one-third of the companies employ fewer than 10 employees and about one-half employ between 11 and 100 employees. The companies profiled employ a total of 4,900 employees, about 66% of which are located in Atlantic Canada. Leaving aside the two largest companies, Jacques Whitford and xwave, the remaining companies employ about 1,400 with 93% of those located in Atlantic Canada.

Exhibit 6.8 – Size Distribution of ITS-capable Companies in Atlantic Canada



Market Geography

There is no consistent pattern in terms of market geography. At one end of the spectrum are firms whose market is virtually all within the Atlantic Region. At the other end are firms that do not have a market in the region but deal mainly with international clients. There are also many companies that fall somewhere in between. Neither was there any pattern in terms of future growth, some indicating they wanted to expand their market share in the Atlantic Region or Canadian markets, others suggesting a focus on penetration or expansion with respect to international markets.

6.4.5 Concluding Observations

This review of the Atlantic Region ITS capabilities yields the following summarized observations:

- A range of capabilities relevant to ITS development and implementation is resident in Atlantic Canada.
- Although only a few companies in Atlantic Canada are currently producing for the ITS market, there are many firms with latent capabilities that could be adapted to ITS. Such transfers will be contingent upon the availability of an adequate market and complementary skills, technologies and resources to access that market. This inventory will be of assistance with regard to the latter.
- The most obvious 'clusters' of ITS-applicable technology lie in the areas of information technology, sensors and surveillance, and geomatics. There are also clusters of supporting activities such as more general information technology, courseware and e-learning, translation and customer contact centres.

- Few companies operate independently. The vast majority rely on one or more strategic alliances or other working relationships with industry and academia. These relationships provide access to complementary expertise and experience, research, hardware and software components, or simply a broader market reach.

- There is a strong network of potential support for the further development of an ITS industry in the form of industry associations (particularly information technology), centres of excellence, high-level academic institutions, and incubators/accelerators.

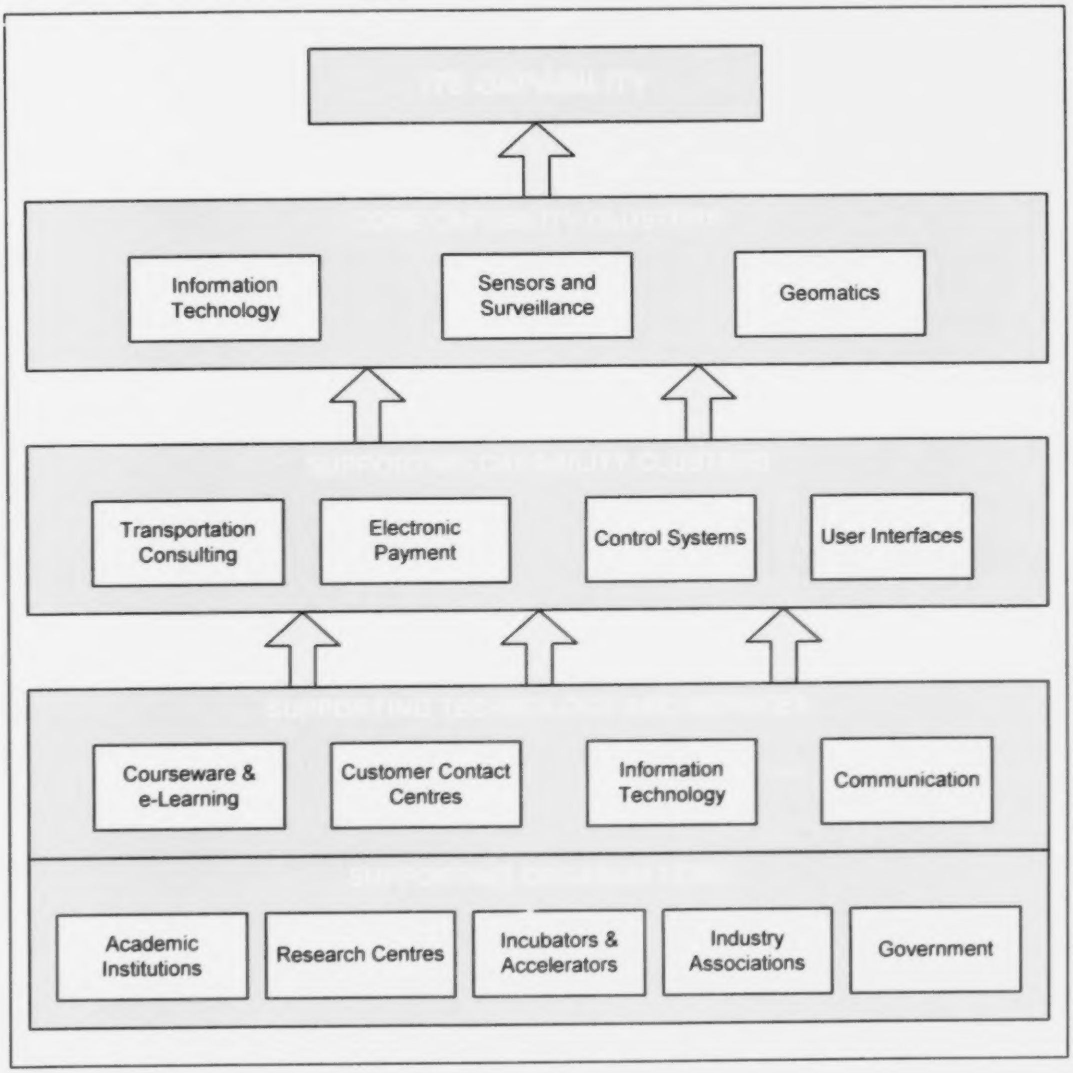
- The roles played by the companies profiled in the Capabilities Inventory range from integrators who package components from other manufacturers, perhaps with internally developed software and interfaces, to create turnkey systems; to niche companies who specialize in one or a small group of closely-related products or services. Seimac Limited and Approach Navigation Systems Inc., both profiled in the previous section, are both integrators and product developers.

- While many of the businesses identified as ITS-capable are actually involved in ITS-analog rather than ITS activities, many of them have indicated a capability to adapt to ITS requirements **provided there is a large enough market.** This would likely necessitate the penetration of larger, international markets.

- Many of the ITS-capable companies profiled serve a predominantly international market, with only a few operating predominantly in the Canadian market and only a very few serving a significant market in Atlantic Canada.

Exhibit 6.9 provides a hierarchical summary of the ITS-capable businesses, organizations, agencies, and institutions present in Atlantic Canada. These represent a range of possible levels of participation in the implementation of the recommended ITS strategy for Atlantic Canada, from core enabling capabilities to supporting services. It may be that many of the enabling technologies and supporting services needed to implement the proposed ITS strategy, with some adaptation and out-sourcing, can be found in Atlantic Canada.

Exhibit 6.9 – Summary of ITS Capabilities Hierarchy in Atlantic Canada



6.5 ITS CASE STUDIES

This section provides a current snapshot of what is happening in the world of Intelligent Transportation Systems in the Atlantic Provinces. It summarizes the current status of real-world ITS activities in the region from two perspectives; ITS projects in place or underway, and companies active in ITS products and services. It presents a capsule summary of the ITS Showcase held in Halifax on April 25, 2002.

6.5.1 Context – Key Considerations in ITS Implementation

ITS in the Atlantic Provinces, as is the case across the rest of Canada, is in a state of relative infancy. It is only in the last decade, with a few exceptions, that ITS has begun to emerge as a mainstream strategy to facilitate the movement of people, goods, services, and information. This is particularly critical to maintain the economic competitiveness of the Atlantic Region. This emergence is a result of several factors, including the recognition that traditional approaches to addressing transportation needs and problems are constrained by limited resources, namely time, money, and space. Also a factor is the availability of advanced 'enabling' technology, often developed to meet defence needs (an example might be Global Positioning Systems), that is adaptable to transportation purposes.

The Atlantic Provinces Regional ITS Strategic Planning Study has illustrated that there are a number of unique considerations related to the role of ITS in the region in the context of the rest of the continent. Specifically, the functional needs within the region focus on the efficient movement of goods, with provision of comprehensive traveller information, and a number of considerations related to rural transportation environments such as incident response and winter maintenance. The application environment is characterized by a relatively low, widely dispersed population base, and extreme climate conditions. These needs and characteristics of the Atlantic Region point to some of the evolving areas of the ITS industry, such as cargo tracking and security, and business models for advanced traveller information. Some of the more developed areas within ITS, such as urban traffic management, are less relevant in the Atlantic context.

Through this study of the Atlantic Region two fundamental principles have emerged which will underlie the implementation of the proposed ITS strategy:

The proponents of most Intelligent Transportation Systems initiatives will have to draw knowledge, technology, products, and services from a pool that will involve multiple, collaborating businesses, organizations, agencies, and academic institutions.

ITS initiatives combine a range of applications that involve enabling technologies from the fields of information technology, communications, instrumentation (sensors), custom electronics, geomatics, control systems, user interfaces, marketing, and training. Two of the key challenges associated with implementing ITS are:

- The integration of the physical systems, including new and legacy systems, and the role of interoperability standards.

- The forging of a common purpose and commitment among the many stakeholders involved in some application environments, such as border crossings.

The ITS projects showcased in this report typically exhibit these characteristics of multi-disciplinary stakeholders working together to apply enabling technologies.

Given the burgeoning nature of ITS, most companies involved in ITS will need to address a market that goes beyond the scope of regional ITS demand, either geographically, or involving non-ITS areas that share similar functional requirements.

In part, this is simply a corollary of the reality that private-sector involvement in ITS often comes about as a by-product of involvement in another area, such as defence, aerospace, marine operations, or communications, that shares analogous problems and solutions. This gives rise to the term "ITS-analog" which will crop up in the text from time to time. For the several companies that are showcased, it is clear that ITS is not their core business. Instead, they may have recognized that the products and services they were applying in another area had potential application to address transportation needs, given a market and appropriate adaptation and packaging.

It is apparent, in reviewing the brief company profiles contained in the ITS Capabilities Inventory that most companies involved in ITS or ITS-analog applications have developed or are seeing the need to develop an international market for their products and services. This is typical of the ITS industry, and is not unique to the ITS industry. As a comment on the industry as a whole, most companies providing products and services are targeting a particular application within the ITS arena. An example would be a Road Weather Information System (RWIS) provider, or a traffic management system software provider. As a result, any given company is active in a very targeted specialized technology area within an industry which is relatively specialized as a whole. Hence, most suppliers to the industry must be active in international markets. There are numerous examples of ITS suppliers in Canada that conduct over 80% of their business in the United States and overseas markets.

6.5.2 ITS in the Atlantic Provinces – A Solid Beginning

Existing ITS projects in Atlantic Canada, as well as the projects proposed in conjunction with the ITS strategy recommended in this study, have emerged from the identification of a need or a problem that was either not amenable to more traditional solutions or was perhaps seen as more effectively addressed using ITS solutions. These projects have arisen from a desire to improve service to customers or the public at large, reduce costs, or address a specific problem, along with recognition of the opportunities that ITS presents to achieve these objectives.

Take for example, the Province of New Brunswick's current WIM (Weigh-In-Motion) initiative. The re-alignment of the highway served by a commercial vehicle weigh-station meant that the highway was no longer visible from the inspection facility, making enforcement difficult. A traditional solution might have been to move the inspection facility, an expensive proposition. However, the Province recognized that the solution to this problem could be combined with reducing delay to commercial vehicles in a key trade corridor, and reducing collision risk at the weigh-station access points by implementing a WIM facility – an ITS solution. Also recognized was an opportunity to evaluate WIM technology for potential application on a more widespread basis.

Another example is the implementation of an adaptive traffic signal control system (SCOOT) in the Regional Municipality of Halifax. Given the mature nature of the central city, it was recognized that traditional approaches, namely increasing physical capacity, were not available to address increasing traffic congestion. Enter SCOOT (Split Cycle Offset Optimization Technique), a means of increasing operational efficiency and squeezing more capacity out of the existing road system. It helped that reducing congestion, relative to previous operations, would reduce delay for the travelling public. A reduced need to manually update signal timing plans, a costly process, was another recognized benefit of this ITS solution.

The examples of WIM and SCOOT are indicative of the region's ability to adopt state-of-the-art ITS solutions. While these technologies were not developed within the region, it is noteworthy that resources within the region have been successfully able to develop and exercise a program related to these technologies, including installation design, procurement, deployment and integration, and ongoing operations and maintenance. This speaks to skill sets and expertise which is evolving within the operating agencies in the region related to ITS applications. Given the continent-wide, and international scope of many suppliers, it is often typical of deployment that products are sourced internationally. In the case of WIM equipment, one of the world's leading suppliers is International Road Dynamics based in Saskatoon, Saskatchewan. The SCOOT system has its foundations from the Transportation Road Research Laboratory in the United Kingdom.

Current ITS initiatives in the Atlantic Provinces, along with those put forward through the ITS strategy proposed in this study, have been backed up by a planning process that recognizes the progression from an assessment of user needs and objectives, through identification of opportunities, to the putting forward of concrete projects. This represents a promising start and a solid foundation to build upon.

6.5.3 The ITS Showcase

The current study included an ITS showcase in Halifax, Nova Scotia on April 25, 2002, attended by approximately 40 people. This event was designed to showcase existing ITS efforts in Atlantic Canada, both from the perspective of the projects that have been undertaken or are underway, and from that of the businesses that are leading the way in the ITS marketplace. More than this, however, the showcase was intended to identify participants in the ITS field and provide fertile ground for the identification of possible collaborations, strategic alliances, and the other working relationships that will be necessary for successful ITS implementation.

The Halifax showcase addressed the penetration of international markets and exposed the participants to several existing ITS initiatives, including the "smart" snowplow, RWIS (Road Weather Information Systems), fleet tracking and management, and geomatics as an ITS enabling technology. The ITS Atlantic Roundtable identified candidate businesses to feature in the showcase. The resulting participants included:

- Seimac Limited (fleet tracking and management, road weather (RWIS)-related meteorological forecasting).
- Approach Navigation Systems Inc. (road weather information systems (RWIS)).
- Geoplan Consultants Inc. (geomatics).
- Future Learning Inc. (courseware and e-learning).
- Pinter Consulting Services (advanced modelling/analysis for operations research).

Seimac, Approach Navigation, and Geoplan represent examples of businesses which are actively marketing ITS systems or enabling technologies. Future Learning and Pinter Consulting represent examples of businesses offering supporting services with applications in ITS. An invitation was extended to a broad range of stakeholders who had participated in the study workshops and focus groups to join in the half day showcase session in Halifax as a presenter and/or exhibitor. The presentation sessions as noted above provided a meaningful cross-section of technology areas, and business experiences for key ITS, or ITS-related firms within the region. Beyond the organizations participating as presenters, there was limited further involvement from other organizations in terms of the showcase exhibit area. It should be noted that many of the smaller firms participating in the study expressed an interest in participating in the showcase but were influenced by other pending commitments and deliverables. To put the showcase in the context of the national ITS industry, the 2002 ITS Canada Annual Meeting in Toronto attracted 120 participants and 8 exhibitors over a two day period.

The following sections showcase the current ITS initiatives in Atlantic Canada, and the key companies that volunteered their time to address the showcase participants.

6.5.4 ITS Project Case Studies

The following profiles cover nine projects that have been completed or are underway across the Atlantic Provinces. This may not be an exhaustive list, but it gives a good idea of the range of initiatives currently being pursued. In many cases, the key enabling hardware or software products included in the application have not necessarily originated from within the region. However, the projects are noteworthy from the perspective of the experience of the installation, integration, operations and maintenance resources within the region associated with the various projects. The identified projects are:

- Province of New Brunswick – WIM (Weigh-In–Motion project at Longs Creek);
- Strait Crossing Bridge Limited – bridge traffic surveillance and management;
- St. John's, Newfoundland – transit AVL (Automatic Vehicle Location[*]) and schedule management and information system;
- Halifax Regional Municipality, Nova Scotia – "GoTime" real-time bus tracking and schedule management and information system;
- Province of Nova Scotia – RWIS (Road Weather Information Systems);
- Halifax-Dartmouth Bridge Commission – electronic payment (MacPass) and bridge traffic management;
- Halifax RM, Nova Scotia – SCOOT advanced traffic signal control system;
- Province of Nova Scotia – "smart" snowplows; and
- Provincial Governments of Atlantic Canada – tourist and travel information websites.

Detailed project profiles are included as Appendix P. In some cases, the systems needed to implement these projects were assembled locally, such as the RWIS systems integrated for the Province of Nova

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[*] AVL (Automatic Vehicle Location) – AVL refers to the use of spatial-recognition technology to identify communicate the location of a fleet of vehicle. This can boost dispatch efficiency and service reliability.

Scotia by Approach Navigation Systems Inc. Regional companies typically also supply the installation, maintenance, communications, and similar services. However, much of the ITS technology currently comes from outside the region. In the case of the RWIS systems in Nova Scotia, the basic components are produced by Qualimetrics in the United States. Other 'outside' companies supplying to the region include SGI, GMSI, Intrex, and Transcore/Amtech. Other ITS systems have necessarily originated outside the region such as New Brunswick's weigh-in-motion system which will be supplied by IRD in Saskatoon. Although capabilities exist in the Atlantic Region to develop and implement ITS systems (see Section 7), in only a few cases to date have companies in the region penetrated the ITS market to the point where they are now identifiable as an ITS system supplier.

6.5.5 ITS Company Case Studies

The companies showcased in this section represent a sample of the many ITS-capable companies resident in the Atlantic Provinces. The full list of companies reviewed under the Economic Development and Academic/Research activities is included as Exhibit 6.6. The products and services of these companies are readily identifiable as ITS or ITS-enabling and they were present at the Halifax showcase. They are:

- Seimac Limited – fleet tracking and management, road weather (RWIS)-related meteorological forecasting;
- Approach Navigation Systems Inc. – road weather information systems (RWIS);
- Geoplan Consultants Inc. – geomatics;
- Future Learning – computer-based winter operations training.

Appendix Q includes profiles of each of the showcased companies. The profiles include descriptions of their ITS-related services and provide some basic information on the company.

The case studies reflect a variety of experiences in entering the ITS market, drawing upon expertise from other sectors. For example, Seimac brings their RWIS site-specific forecasting services based upon extensive meteorological services for the maritime oil and gas exploration and production industry. Most recently, through the resources of their parent organization, the Chelton Group of Companies, Seimac is bringing advanced MSAT satellite communications services to the commercial vehicle operations industry. Whereas standard cellular phone operations use microwave towers to connect, the MSAT service is based on high-powered satellites beaming signals to a receiver the size of a briefcase. This allows drivers in remote areas to have a reliable and static-free telephone call from virtually anywhere.

In the case of Approach Navigation Systems, the organization has drawn upon core strengths in airport navigation, illumination and communications systems, and automated weather observation stations, to develop ITS areas of business, namely RWIS deployment and Fixed Automated Spray Technology (FAST) for bridge de-icing.

Geoplan Consultants have a strong history of working in the transportation sector with a specific focus in geomatics and geographic information systems. As an extension of these core strengths, Geoplan is pursuing opportunities for increasing involvement in ITS applications involving real-time location referencing, such as enhanced 911 services, fleet management, and route guidance/navigation.

Future Learning is an example of one of the many ITS capable companies within the region that can provide supporting services. Their core strengths are courseware and e-learning for a range of applications and their impetus for involvement in the ITS market was in response to a specific solicitation for computer-based winter operations training services which originated in Minnesota.

In some cases there are opportunities for companies within the region to work in partnership and provide complementary services. For example, the forecasting services offered by Seimac can complement the RWIS deployment, maintenance and operations activities which may be undertaken by Approach Navigation System.

In summary, there is a general trend wherein the companies which are participating in the ITS market have transferred technologies from other related industries which have an industrial presence in the region. It is most likely that the initial ITS activity would occur within the region, but this is not necessarily always the case. Drawing upon the resources of related companies, or partnerships with other organizations, offers opportunities to deliver more complete applications, and expand geographic reach.

6.6 MARKET ANALYSIS

This section builds on previous chapters that identified the current level of Intelligent Transportation Systems development in the Atlantic Region, and maps these against the potential regional, national, and international markets. It goes on to determine the preparedness of the Atlantic Canada ITS industry toward increasing its share of the international ITS market, and gauges the relevance of current Atlantic ITS efforts and future capabilities. The chapter concludes by providing strategic recommendations for industry advancement.

6.6.1 The ITS Market

This section looks to characterize the demand side of ITS by discussing deployment in different regions. Although ITS first appeared in the 1970's and 1980's, only when the U.S. federal government became actively involved in the early 1990's did the market blossom. Since then, Europe and Japan have joined the U.S. as the three largest ITS markets. Some fundamental differences exist between the ITS funding programs of the three regions. Whereas the U.S. program emphasizes planning and deployment, Europe and Japan weight their funding more toward research and development. In addition to these three markets, many developing regions are starting to look to ITS to help stimulate growth. Some of these burgeoning markets have been highly accessible to the Canadian ITS industry.

Atlantic firms that may be wary of entering the international market can look to successful examples from across the country. Canadian firms are active and well-respected players on the world stage. For example:

- Saskatoon-based IRD is the leader in Weigh-In-Motion deployment across the continent;
- Mark IV Industries produces in Mississauga the readers and tags for the widely deployed IAG E-Z Pass electronic toll collection system;
- Other Canadian firms operating abroad are Ledstar (VMS), EJS (traffic sensors), Delcan, IBI Group, McCormick Rankin and SNC Lavalin (engineering services and software).

The development of ITS architecture in the major deployment centres around the world signifies an important shift in the make-up of the ITS market. The move marks a transition from a less-developed, burgeoning market where products are 'built-to-specifications' to a more-established, commodity-based market where pre-existing products are adapted to meet agency needs. The advantage of a commodity-based market with a set of standards defining the products and interfaces is that established suppliers are able to deliver the product at a lower cost, because they have previous experience and work to draw from. However, it also permits new entrants because smaller firms can develop their products based on the standards, instead of trying to develop and market purely proprietary systems. This translates to an increase in ITS deployment with the benefits trickling down to the traveller. Governments can stimulate the transition to a commodity-based market by offering steady levels of deployment funding, and leading standardization and architecture-building efforts.

The rest of the section will introduce the major markets that are accessible to the Atlantic Canada ITS industry. The North American market, the most feasible target, is discussed in three sub-sections: Atlantic Canada Region, Canada, and the United States. A fourth sub-section discusses international markets including Europe, Japan and other emerging markets.

6.6.1.1 Atlantic Canada Region

Various projects in the Atlantic Provinces demonstrate the region's capabilities in developing ITS market packages[*]. Implementation of an advanced traffic signal control system (SCOOT) in the Regional Municipality of Halifax, and the current Weigh-In-Motion (WIM) initiative in New Brunswick demonstrated successful progressions from an assessment of user needs and objectives, to the identification of opportunities, through to deployment. Other examples of projects in motion are St. John's, Newfoundland's transit Automatic Vehicle Location (AVL) and schedule management and information system, and the Province of Nova Scotia's Road Weather Information Systems (RWIS) initiative. Most recently, the Confederation Bridge in partnership with Transport Canada is implementing StraitPass, a commercial vehicle electronic toll collection system. Typically the technology has been imported to the region and local designers/constructors have participated in the deployment. As an example, TransCore provides electronic toll tags and readers for the Atlantic Region.

In developing an ITS Strategic Plan for Atlantic Canada, transportation needs were first identified and prioritized. Exhibit 6.10 summarizes the needs as identified under Step 2 – User Services Plan, with high-priority needs highlighted:

Exhibit 6.10 – Atlantic Canada ITS Needs

Need	Description
1	Expedited Border-Crossing Inspection and Clearance for Commercial Vehicles
2	Reduce Rural Road Collisions Through Early Detection of Adverse Conditions
3	Reduce the Incidence, Severity and Cost to the Community of Road Collisions
4	Improved Safety in Road Work Zones
5	Enhanced Management of Winter Maintenance Operations
6	Expedited Weight, Credential, and Safety Checks for Commercial Vehicles
7	Road Emergency Notification and Information System for Rural Areas

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[*] Market packages refer to a group of pieces from the ITS Architecture required to implement a service.

Need	Description
8	Improved Ferry Services, Particularly Nova Scotia – Newfoundland
9	Provide Travel Incentives and Traveller Information to Promote Tourism in Atlantic Canada
10	Enhanced Safety and Security for Travellers and for Transportation Operators and Facilities
11	Enhanced Ability to Detect, Verify, and Respond to Incidents on Major Roadways
12	Enhanced Tracking and Real-Time Management of Containers and Other Goods at Intermodal Terminals
13	Real Time Transit Service Monitoring and Public Information
14	Improve Management of Fleet Transportation Services
15	Real-Time Management of Parking Operations

Consultation with the stakeholder community yielded Sixteen User Services as most appropriate for dealing with the region's needs. Exhibit 6.11 highlights the services. Appendix R provides descriptions of each user service, along with associated enabling technologies.

Exhibit 6.11 – Higher Priority User Services

1.1	Traveller Information
1.4	Traveller Services and Reservation
2.1	Traffic Control
2.2	Incident Management
2.4	Environmental Conditions Monitoring
2.5	Operations and Maintenance
2.6	Automated Warning and Enforcement
3.1	Public Transport Management
4.1	Toll Roads, Parking and Transit
5.1	Commercial Vehicle Electronic Clearance
5.5	Intermodal Freight Management
5.6	Commercial Fleet Management
6.1	Emergency Notification and Personal Safety
6.3	Disaster Response Management
6.4	Emergency Vehicle Management
8.1	Weather and Environmental Data Management.

As part of the Atlantic ITS Strategic Plan, a series of projects were recommended. They were identified as having significant potential based upon the needs analysis and the corresponding User Services definition. Exhibit 6.12 is a summary of the final list of the twenty-two projects recommended in the Plan. A brief description of each project can be found in Section 5.1.3. Any organization seeking further details in terms of project system definition can refer to the corresponding market packages in the ITS Architecture for Canada.

Exhibit 6.12 – Recommended Project List

Project Reference	Project Name
TI-1	Atlantic Provinces Advanced Traveller and Tourist Information System
TM-1	Atlantic Provinces ARWIS Expansion
TM-2	Wildlife Detection in Atlantic Canada, Scoping Study and Pilot Project
TM-3	Implementation of Fixed Automated Spray Technology (FAST) for Bridge De-icing
TM-4	Red Light Camera Pilot Project
TM-5	Portable Changeable Message Sign (PCMS) for Work Zones
TM-6	Smart Snowplow Expansion
TM-7	Bridge Incident Management Scoping Study
PT-1	Urban Transit Real-Time Information Service
PT-2	Community Transit Fleet Management
EP-1	Parking Electronic Payment and Monitoring
EP-2	Atlantic Canada Transaction Tag
EP-3	Smart Card Pilot Project
CV-1	Integrated Intermodal Information System
CV-2	Atlantic Trade Corridor Border Security and Electronic Inspection
CV-3	Atlantic Canada Electronic Permitting for Oversized and Overweight Vehicles
CV-4	Port Operational Information Extranet
CV-5	Port Container Security
CV-6	Airport Groundside Transportation Management
CV-7	Commercial Fleet Management Program
EM-1	Wireless Network Expansion
EM-2	Atlantic Provinces Disaster Response Plan Scoping Study

Notes:

TI – Traveller Information	TM – Traffic Management
PT- Public Transport	EP – Electronic Payment
CV- Commercial Vehicle	EM – Emergency Management

Various funding sources were identified in Section 3.4. Transport Canada, for example, has several programs available that can potentially fund ITS projects. While some of the sources are open to nearly all ITS initiatives (i.e. ACOA's Atlantic Innovation Fund, NRC's Industrial Research Assistance Program), others are channelled to specific User Service Bundles*. For example:

- Transport Canada's Moving on Sustainable Transportation Program, and Environment Canada's Green Fund Climate Change Action Fund, focus on sustainable transportation initiatives.
- Transport Canada's Freight Efficiency and Technology Initiative, and the U.S. Department of Transportation Federal Highway Administration's TEA-21 – Coordinated Border Infrastructure Program, offer funding to freight and smart border technologies.

Exhibit 6.13 summarizes the major funding sources for ITS projects in Atlantic Canada and identifies which User Service Bundles are targeted by each source. Generally the funding programs can be categorized as product development or infrastructure management based. The product oriented programs are applicable to any user service area. An example of this type of program is PRECARN, an organization of private sector companies that co-fund research. Initiatives such as the Canada infrastructure program focus on investments in physical infrastructure to enhance safety and mobility.

Exhibit 6.13 – Canadian Funding Opportunities

Funding Source	1. Traveller Information Systems	2. Traffic Management Systems	3. Public Transport Services	4. Electronic Payment Services	5. Commercial Vehicle Operations	6. Emergency Management Services	7. Vehicle Safety and Control Systems	8. Information Warehousing Services
Transport Canada								
Strategic Highways Infrastructure Program (SHIP)	✓	✓		✓	✓	✓		
ITS Deployment and Integration Plan	✓	✓	✓	✓	✓	✓	✓	✓
Moving On Sustainable Transportation (MOST) Program	✓	✓	✓	✓				
Urban Transportation Showcase Program	✓	✓	✓	✓				
Freight Efficiency and Technology Initiative					✓			
Climate Change	✓	✓	✓	✓				
Ministry of Finance								
CCRA Tax Credit	✓	✓	✓	✓	✓	✓	✓	✓
Canada Infrastructure Program								
Physical Infrastructure Program	✓	✓	✓	✓				
Strategic Infrastructure Program	✓	✓	✓	✓				
Environment Canada								
Green Fund Climate Change Action Fund (CCAF)	✓	✓	✓	✓				
National Research Council								
Industrial Research Assistance Program (IRAP)	✓	✓	✓	✓	✓	✓	✓	✓

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[*] A logical grouping of user services that provides a convenient way to discuss the range of requirements in a broad stakeholder area.

Funding Source	1. Traveller Information Systems	2. Traffic Management Systems	3. Public Transport Services	4. Electronic Payment Services	5. Commercial Vehicle Operations	6. Emergency Management Services	7. Vehicle Safety and Control Systems	8. Information Warehousing Services
Industry Canada								
Lean Logistics Technology Roadmap					✓			
Transportation Association of Canada								
Various Project Opportunities	✓	✓	✓	✓	✓	✓	✓	✓
Atlantic Canada Opportunities Agency								
Atlantic Innovation Fund (AIF)	✓	✓	✓	✓	✓	✓	✓	✓
Business Development Program (BDP)	✓	✓	✓	✓	✓	✓	✓	✓
Provincial Governments								
New Brunswick Innovation Fund	✓	✓	✓	✓	✓	✓	✓	✓
Provincial Tax Credit Programs	✓	✓	✓	✓	✓	✓	✓	✓
U.S. Department of Transportation Federal Highway Administration								
TEA-21 Coordinated Border Infrastructure Program		✓			✓			
Precarn								
IRIS (Institute for Robotics and Intelligent Systems)	✓	✓	✓	✓	✓	✓	✓	✓
T-GAP	✓	✓	✓	✓	✓	✓	✓	✓
Regional Alliance Program	✓	✓	✓	✓	✓	✓	✓	✓

Note that the Department of National Defence has a strong presence in Atlantic Canada and might offer programs that would help develop ITS-related technologies. Furthermore, there are a number of opportunities for non-monetary means of support. Examples include trade missions led by ITS Canada and Trade Team Atlantic, led by ACOA and the provincial governments.

Of the eight User Service Bundles, Emergency Management Services (6), Vehicle Safety and Control Systems (7) and Information Warehousing Services (8) have the most limited sources for funding.

Firms considering entering the ITS Market may wish to consider the clustering of funding sources, and focus on the Use Service Bundles where there are more funding sources.

6.6.1.2 The Canadian Market

Canada has historically been at the forefront of ITS deployment. The primary focus of development has been toward Advanced Traffic Management Systems. Examples of this include:

- Halifax, Red Deer, and City of Toronto's Split Cycle Offset Optimization Technique (SCOOT) systems, which provide real-time traffic adaptive signal control;
- Toronto's Road Emergency Services Coordination Unit (RESCU) corridor traffic management system;
- Ontario's COMPASS and a similar freeway management initiative in Montreal; and

- Highway 407 Electronic Toll Route running through the Greater Toronto Area, which was the world's first all-electronic open access toll road.

Other areas of development have been:

- Commercial Vehicle Preclearance at inspection stations under the Automated Vehicle Identification (Ontario) (AVION) project.
- Commercial Fleet Management (operation of taxis and limousines at Lester B. Pearson International Airport); and
- Advanced Public Transportation Systems and Electronic Payment (Burlington Smart Card Farebox Collection System).
- Road Weather Information Systems (RWIS) development and deployment in regions across the country.

Canadian Needs

Urban congestion is clogging Canadian inner-city highways and arterials and putting strain on the economy. Rising urban population bases and rising incomes lead to greater traffic demands in cities where road infrastructure development has curtailed in recent years. Increasingly, system planners are turning to Advanced Traveller Information Systems (ATIS), Advanced Traffic Management Systems (ATMS), and Advanced Public Transport Systems (APTS) to deal with the problem. Urban congestion management should continue to be a key need for Canada in the future.

Trade corridors, including the Atlantic Coast trade corridor and the Quebec City-Montreal trade corridor, play an integral role in Canada's transportation system. ITS initiatives to increase volume, improve safety, reduce delay and incident-detection time are often considered for sections along these corridors. As volume and congestion along these corridors increases, this trend is sure to continue. This is true not only for corridors within Canada, but also for north-south corridors connecting Canada and the United States. The Canadian federal government has announced $1.2 billion over 3 years to improve border security and efficiency.

With the majority of urban centres situated within one hour of the Canada-U.S. border, ITS and related smart border initiatives have recently emerged as important tools for improving the operation of border crossings. Related to this are CVO initiatives, including border pre-clearance and Weigh-In-Motion technologies.

Other critical needs are starting to be dealt with using ITS. Rural areas in Canada are beginning to look at RWIS deployment as a viable strategy for improving safety, particularly during times of inclement weather and networking the information. Transit agencies are looking to ITS for ways to improve service and attract ridership.

Several enabling technologies will be important in developing ITS solutions. GPS (including differential GPS) is a relatively mature technology and useful for Automatic Vehicle Location (AVL) systems, such as for transit or freight. Short-range communication is important for many ITS applications, including for electronic tolling, AVL, CVO, border pre-clearance, and traffic monitoring. Vehicle-to-vehicle communications, a much less developed area within ITS, can be applied in intersection collision avoidance and vehicle platooning.

Deployment and the Role of Transport Canada

Deployment of ITS across Canada has typically been spearheaded by government. In addition to Provincial and Federal investment, Municipal governments provide significant funding for ITS projects in the country's large urban centres. There is also an increasing role for private firms to deploy and operate systems. Electronic Toll Highways, Commercial Vehicle Operators, and Border Crossings are three services where the private sector assumes a big delivery and operations role.

In the ITS Plan for Canada[20], Transport Canada identified six challenges to keeping Canada's transportation system successful:

1. *Congestion in densely populated corridors*: Although urban transportation falls under the jurisdiction of the municipalities and provinces, urban congestion affects the performance of our national and international transportation networks. Greater integration of urban and inter-city transportation modes is needed; this will only happen with all levels of government and stakeholders working together.

2. *Environmental pressures, especially climate change*: About 26% of Canadian Green House Gas emissions are attributed to transportation, split evenly between urban and inter-city transportation.

3. *Competing pressures for limited financial resources*: Innovative financing mechanisms are necessary as governments evaluate the level of infrastructure required to meet the needs of users in a way that is financially, socially and environmentally sustainable.

4. *Preserving and improving existing infrastructure to accommodate growing demand*: Canada's existing network is not designed to support the expected growth in traffic (50-100% increase in private-vehicle traffic over the next 25 years), and even if funds were available to build the required infrastructure, the environment would not be able to sustain it.

5. *Ensuring the safety of our transportation system*: Transport Canada is committed to making Canada's transportation system one of the safest in the world.

6. *Providing services to clients and customers more effectively and efficiently*: This includes reducing congestion, improving response times to accidents and incidents, faster toll collection systems on roads and bridges, faster and more efficient regulatory compliance measures for commercial vehicles on highways and at border crossings, enhanced information about alternative transportation options, improved intermodal transfers, collecting and sharing information for improved decision-making, etc.

In addition to funding deployment, the Federal government has been active in ITS in other ways. Transport Canada recognizes its role in stimulating ITS development and deployment across the country and putting the country's ITS industry in a position to compete in the growing global market place. In the Plan, three streams of activity are identified:

1. Raise awareness and demonstrate that wide-spread use and interoperability of ITS can improve safety and mobility and facilitate interprovincial and international trade and tourism;
2. Support strategic deployment and integration of ITS to maximize the use and efficiency of existing infrastructure and meet future mobility needs more responsibly;
3. Strengthen Canada's ITS industry to take advantage opportunities in the expanding global market place. 'Showcase' deployments, such as the Greater Toronto Area's COMPASS in the late 1980's, directly benefit the operator, but also have the secondary benefit of industrial development for the participating firms. In doing so, Canadian firms gain an advantage when bidding for similar projects in other areas of the world.

To that effect, Canada's ITS Plan is founded on five interconnected pillars:

1. **Partnerships for Knowledge**: Various partners need to play a critical role to successfully develop and implement the ITS Plan, including all levels of Canadian government, the private sector, including ITS Canada, suppliers of ITS technologies, and operators of transportation services and systems, academia and our North American counterparts.
2. **Developing Canada's ITS Architecture**: The architecture (http://www.its-sti.gc.ca[21]) will provide the framework for deploying ITS applications across agencies, jurisdictions and systems and ensuring that the products and services are compatible. The architecture defines the functions of various components and specifies how they will be interconnected to work together, as well as identify the standards needed to ensure that ITS components operate in a consistent and predictable way.
3. **A Multimodal ITS R&D Plan**: For Canada's ITS industry to capture a significant portion of the global ITS market, the Federal government will have to continue to support R&D. Based on this premise, Transport Canada has several ventures aimed at encouraging innovation. The Transportation Development Centre has supported a variety of multimodal R&D projects to demonstrate the potential and feasibility of ITS, as well as having encouraged the development of new ITS applications.
4. **Deployment and Integration of ITS Across Canada**: Transport Canada will provide limited funding to accelerate the deployment of ITS across all modes. A deployment plan will guide and manage deployment activities supported by the federal government. Appendix S provides a list of Canadian ITS proposals selected for funding for 2002/03-2003/04.
5. **Strengthening Canada's ITS Industry**: Canada has the opportunity to capture a significant share of the global market based on its communications and information technology capabilities. The federal government will work with the provinces and the private sector to develop export opportunities for Canadian ITS firms.

Unlike the U.S., Europe and Japan, Canada does not have a single large dedicated stream of funding for ITS deployment. Instead, ITS projects draw on funding from smaller programs. Transport Canada is in the 2nd year of a 30-million dollar 5-year plan geared towards developing partnerships for deployment as well as a nationwide CVO network and RWIS. Also, Transport Canada provides funding to ITS through other projects. Growing environmental considerations such as the Kyoto Agreement will put added pressure on transportation to become more efficient, potentially increasing the sources for ITS funding. Provinces, municipalities and industry are also relied on for funding ITS deployment. In the past, Canada has been a leader in advancing the industry in targeted areas, an example of which is the 407 Electronic Toll Route in Ontario. But without further investment, Canada will lose its competitive advantage.

6.6.1.3 The U.S. Market

The U.S. ITS market is well-developed, with funding coming from all levels of government. However, compared to Japan and Europe, the United States began investing in ITS relatively late. The Intermodal Surface Transportation Efficiency Act (ISTEA) marked the entrance of the United States into the ITS arena. The act, introduced in the early 1990's, galvanized the industry and the role of the Federal Government. It mandated the development of a National Architecture and put forth a National Program Plan that involved preparing separate ITS plans for the top 75 urban centres in the country.

ISTEA earmarked $660 (USD) million from the federal government for ITS related projects. In combination with funding to ITS under the Department of Transportation's regular budget, total investment into ITS R&D and deployment was in excess of $1.1 billion by 1997, the year that the act expired. Of the allocated funds, 57 percent was devoted to operational tests and ITS corridor projects, with the balance for research and development, creating the system architecture and other specific programs. The Next Transportation Efficiency Act (NEXTEA) recommitted the government to ITS funding, with $1.3 billion slated for the period from 1998-2002[22]. The program has funded research, technology development and testing and deployment of first-generation ITS applications. It focuses on six key areas:

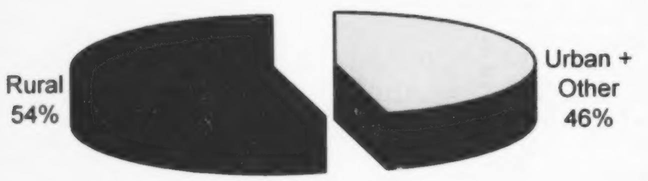
- Enabling Research, which promotes a comprehensive system architecture and standards for ITS;
- Advanced Metropolitan Travel Management, which addresses traffic management, traveller information and transit management;
- Advanced Rural Transportation Systems, which applies ITS to address safety and mobility problems in rural areas;
- Commercial Vehicle Operations, to increase safety, productivity and efficiency in commercial vehicles;
- Advanced Collision Avoidance and Vehicle Safety Systems; and
- Automated Highway Systems, to promote communications between "smart" vehicles and the transportation infrastructure.

The Transportation Equity Act for the 21st Century (TEA-21) set federal transportation spending at $217 billion for 1998-2003. For the first time, TEA-21 allowed ITS projects conforming to the U.S. National Architecture to be financed through mainstream, federal-aid highway and transit categories. This change effectively mainstreamed ITS and was symbolic of its increasing acceptance as an integral part of the national transportation system.

Appendix T characterizes the United States Federal Government funding of ITS projects for 2002.

Interestingly, funding in rural areas account for half (53%) of the total funds (Exhibit 6.14). This includes projects such as RWIS, roadside safety, and automated crash notification. Small urban centres situated in rural areas receive 28.7% of the total funds; cities such as Shreveport, Louisiana, (population: 200,000) and Fargo, North Dakota (population: 91,000) receive significant funding (over $750,000) for ITS projects. This funding is at a level comparable to that of large urban centres in the country (29.2%). Thus, there is significant opportunity in rural-oriented ITS development, with nearly $65 Million (USD) invested by the Federal Government in 2002. Like in Canada, border crossings and trade corridors in the United States also receive significant ITS funding; in 2002, nearly 10% of the Federal ITS allocations went to border and corridor-related projects.

Exhibit 6.14 – U.S. ITS Expenditures



Recall that in Section 3.1, the Atlantic Provinces Priority User Services matched up well with the U.S. Rural ITS Development Track. This, combined with the fact that over 50% of Federal ITS funding in the United States goes toward rural projects presents an opportunity for to showcase rural ITS applications in their respective provinces and transfer them to markets in the United States and the rest of Canada.

The National ITS Program Ten-Year Vision

ITS America is the non-profit professional society that works with the U.S. Federal Government to foster public/private partnerships to increase the safety and efficiency of surface transportation through the application of advanced technologies. In January 2002, ITS America, published a Ten-Year Vision for the National ITS Program[23]. The objective of the vision is to "advance the safety, efficiency and security of the surface transportation system, provide increased access to transportation services and reduce fuel consumption and environmental impact". More specifically, five goals are identified against which progress can be measured. The goals are:

1. Safety: a reduction in annual transportation-related fatalities by 15% overall by 2011.

2. Security: a transportation system that is well-protected against attacks and responds effectively to natural and manmade threats and disasters, enabling the continued movement of people and goods even in times of crisis.

3. Efficiency: to save at least $20 billion per year by enhancing throughput and capacity with better information, better system management, and minimizing congestion by providing efficient end-to-end movement of people and goods, including quick, seamless intermodal transitions.

4. Mobility/Access: universally available information that supports seamless, end-to-end travel choices for all users of the transportation system.

5. Energy/Environment: to save a minimum of one billion gallons of gasoline each year and to reduce emissions at least in proportion to this fuel saving.

The plan proposes a series of Programmatic and Enabling Themes that describe the opportunities, benefits and challenges of the transportation system of the future and activities required to realize this system. Programmatic Themes, presented in Appendix U, reflect opportunities to apply technology to the problems and priorities of surface transportation. Enabling Themes (Appendix V) set the stage and lay the groundwork for the application of technology to surface transportation.

6.6.1.4 The International Market

Japan

Japan was the first country to invest significantly in ITS, beginning in the 1970's. Two major efforts, the Road Automobile Communications System (RACS) and the Advanced Mobile Traffic Information and Communication System (AMTICS) were in effect in the 1980's and dealt with traffic management and traveller information systems both for expressway traffic (RACS) and arterial street systems (AMTICS). By the 1990's, both programs had been completed and the Vehicle Information and Communication System (VICS) was put in place to develop complete system integration with real-time traffic management and route guidance as the primary objectives. The Japanese efforts are probably the most advanced in the world in terms of implementing fully operational infrastructure for drivers across the country.

Through its National ITS budget, Japan invested $665 (USD) million for the fiscal year beginning in April 1996 – almost double the amount requested by the U.S. DOT in its 1997 budget. About $100 million is allocated to R&D in Japan's automated highway system initiative, with the rest going toward ITS deployment. Some experts suggest that growing financial deficits could weaken the government's ability to follow through on ITS investments in the future. It should be noted that whereas there is much activity in the Japanese market, there is still a low level of international participation. Non-Japanese companies have had little success outside of niche areas.

Europe

European investment into ITS began with two primary elements, PROMETHEUS and DRIVE, and has exceeded $1 billion (USD) since 1987. PROMETHEUS ran until 1994, and was aimed at developing technologies for active driver support, cooperative driving, and traffic management. The project received investment in the order of $770 million, and was primarily a private sector effort. The DRIVE program focused on road infrastructure technologies in the area of demand management, traveller information systems, traffic management, fleet management, and other areas. The program has seen over $500 million invested from government, and also has a significant private sector component.

Currently, the European Union promotes ITS development through the Trans-European Network for Transport (TEN-T). The TEMPO program was introduced in 2001 to provide longer term funding, thus supporting medium and long-term projects. Of the $1.2 (B Euros), $200 M comes from the government.

In September 2002, the European Commission will implement Framework Six. This research framework will run until 2006 and provide a total of $2 (B Euros) for research and overall coordination efforts of ITS projects between member states[24].

Emerging Markets

Although the U.S., Europe and Japan are the three largest markets, there are several emerging markets that could prove to be lucrative. Latin America and Southeast Asia are the most promising, with the Indian sub-continent and Eastern Europe also showing some potential. In most cases, toll roads and urban infrastructure projects are receiving the most attention. This suggests an opening for ITS in terms of Electronic Tolling, Advanced Traveller Management Systems (ATMS), Advanced Public Transportation Systems (APTS), and fleet management. More specific examples include:

- Brazil currently is looking to develop a large network of tolled highways that would draw from both the Electronic Tolling sector as well as ATMS;
- Fleet management is essential in Singapore's port to maximize intermodality and security;
- The Chilean Government has traditionally been a strong supporter of public transit and this is expected to extend to APTS projects;
- Argentina and Chile are both active in ITS Planning and are developing their National Architecture;
- Electronic enforcement is a more commonly accepted practice, with examples such as Brazil's red-light cameras and Singapore's electronic road pricing system.

6.6.2 Strengths, Weaknesses, Opportunities, Threats (SWOT)

The potential market for ITS developed in Atlantic Canada is broad. Any given firm should target niche functional or geographic areas within the ITS industry. The primary geographical area that Atlantic Canada industries typically target is North America, with sights also set on developing regions such as South America and Southeast Asia. This section presents a SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis of the Atlantic ITS industry and academic capabilities with respect to the global marketplace.

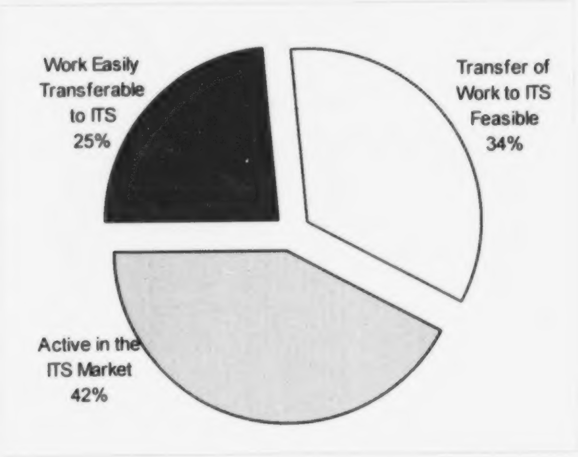
In performing a SWOT Analysis, one examines both internal and external characteristics that influence the direction that the industry should take. Internal Strengths and Weaknesses are created and controlled by the Atlantic industry. On the other hand, external Opportunities and Threats cannot be controlled by the Atlantic ITS industry, but must still be reacted to and/or compensated for appropriately.

6.6.2.1 Strengths

Established Providers

The Atlantic ITS Industry has some companies that are established providers to ITS markets around the world. In addition, there are others prepared to introduce ITS work into their own vision should there be market potential. Exhibit 6.15 shows the proportion of those providers that are already working in ITS to those that are potential providers.

Exhibit 6.15 – Potential Providers' ITS Experience



Current Atlantic ITS Industry capabilities are not evenly distributed among the different ITS user service bundles. Appendix W provides a listing of potential ITS providers for each user service bundle.

Exhibit 6.16 presents the number of potential ITS providers for each of the user service bundles. Exhibit 6.17 goes on to show how many of the providers in each bundle have work experience in ITS or would be able to enter the market if demand existed, as well as the number of providers with foreign experience. From the list of 38 providers profiled, half were involved in Traffic Management Services. Also strongly represented are Public Transportation Services and Commercial Vehicle Operations. On the other side of the spectrum are Electronic Payment Services and Information Warehousing Services with only 13% of potential ITS providers in the region doing work related to those fields. When examining only the 25 providers that are already involved in the ITS market or could easily adjust their work program to access it, Traveller Information Services takes a more significant role with 9 potential ITS providers.

Experience dealing with international customers is an indispensable commodity when discussing promoting industry participation in global markets. Whereas on a whole there are a fair number of providers with international experience (74% overall), some bundles, such as Traffic Management Services (12 of 19, or 63%) and Traveller Information Services (5 of 9, or 56%) have a significantly lower percentage with international experience.

Exhibit 6.16 – Number of Potential Providers for each User Service Bundle

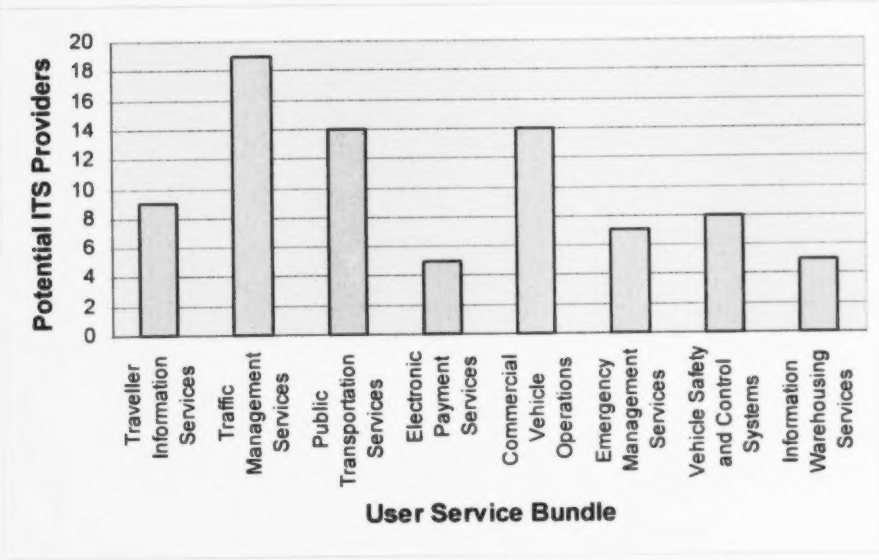


Exhibit 6.17 – Summary of Atlantic Canada Potential ITS Providers

User Service Bundle	No. of Potential ITS Providers		No. with Majority of Work in ITS		No. with Work Easily Transferable to ITS or Already Involved in ITS		No. with International Experience	
Traveller Information Services	9	24%	6	16%	9	24%	5	13%
Traffic Management Services	19	50%	8	21%	15	39%	12	32%
Public Transportation Services	14	37%	7	18%	10	26%	9	24%
Electronic Payment Services	5	13%	4	11%	4	11%	4	11%
Commercial Vehicle Operations	14	37%	9	24%	13	34%	12	32%
Emergency Management Services	7	18%	4	11%	6	16%	5	13%
Vehicle Safety and Control Systems	8	21%	4	11%	4	11%	7	18%
Information Warehousing Services	5	13%	3	8%	3	8%	5	13%
Overall	38	100%	16	42%	25	66%	28	74%

Niche Areas

Some areas of ITS in the Atlantic Region have established providers that would be capable of increasing their share of the international market. In addition, areas of ITS that have been targeted for development for internal reasons (i.e. deployment in the region) may also be considered for export as a secondary purpose. By exploring this information at the User Sub-Service[*] level, we obtain a clearer picture of which niche areas are best suited for the Atlantic Canada ITS Industry. Exhibit 6.18 provides a summary of User Sub-Services that match best the Atlantic's strengths. Appendix X offers a brief description of these services as well as potential providers of each.

Exhibit 6.18 – Niche Areas

User Sub-Service	
2.4.3	RWIS (Road Weather Information Systems)
2.5.1	Infrastructure Maintenance Management
3.1.1	Transit Vehicle Tracking (also known as Automated Vehicle Location)
3.1.2	Transit Fixed-Route Operations
5.5.1	Freight In-Transit Monitoring
5.6.1	Fleet Administration
6.4.1	Emergency Response Management

Other Strengths

There are various core capabilities that would be supportive of ITS implementation. The Atlantic Region is internationally recognized for the development of cores competencies in courseware and e-learning applications. Specific areas of activity in which this industrial strength can support the ITS industry are:

- Driving simulators for passenger vehicles or specialty vehicles such as snow ploughs in order to analyze the human factors considerations associated with new technology applications;
- Emergency services dispatch; and
- Commercial fleet management/dispatch.

Customer contact centres in Atlantic Canada provide voice and web based support services for many large multi-national corporations and public sector entities. With the increasing level of deployment, the focus of ITS applications is increasingly the management of real-time information. Examples of areas of ITS that could benefit from Atlantic Canada's strength in this sector are:

- Incident reporting/management;
- Advanced traveller information systems;
- Fleet management.

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[*] User Services and more specific User Sub-Services represent what the system will do from the perspective of the user. A user might be the public or a system operator.

Other supporting capabilities include the Atlantic Region's experience in the translation service industry, information technology, and telecommunications.

In addition to these sectors, there are various academic/research centres that are able to support the industry. University of New Brunswick, New Brunswick Community College, Memorial University, Dalhousie University, and Mount Saint Vincent University all have programs related to transportation which have incorporated some degree of ITS into the curriculum at the undergraduate, graduate, or post-graduate level. The Research and Productivity Council (RPC), Concept + Inc. (Genieo), and the Electronic Commerce Centre are some of the research centres that provide research development and testing services to assist in the technological innovation process.

Incubator/Accelerator Companies are set up to provide business start-up facilities, training, mentoring, and related services. Some also promote technology transfer from higher-level academic institutions. These companies may be found throughout the Atlantic Canada Region, and include:

- Centre of Excellence in Information Technology (New Brunswick)
- TechPEI/Atlantic Technology Centre (Prince Edward Island)
- Crown of the Valley Development Corporation/Venture Centre (Newfoundland)
- InNOVAcorp/Technology Innovation Centre (Nova Scotia)

The 'clusters' of ITS technology lie in the areas of information technology, sensors and surveillance, and geomatics. This implies that right now Atlantic Provinces firms could contribute somewhat to Traveller Information, Traffic Management, and Commercial Vehicle Operations, and Information Warehousing projects.

6.6.2.2 Weaknesses

The Atlantic Provinces firms that are providing ITS services, or firms that are considered to be ITS-capable, are generally quite small. As described in Task 6.5, one-third of the companies employ fewer than 10 employees, and about one-half employ between 11 and 100 employees. Smaller companies can overcome size disadvantages through seeking out partnership and pooling resources. However, small firms with innovative solutions can be tempted to sell their ideas before they can be put into practice and mass marketed.

Smaller organizations face a number of challenges:

- They do not have the financial resources to fund extensive research and development efforts. The high technology nature of ITS suggests that the industry must be committed to research and development.
- They cannot support a continent wide sales, distribution and technical support network.
- They generally cannot take advantage of "technology transfer" opportunities, compared to larger firms with multiple strategic business units.

Given these weaknesses, the firms have little room for error, and therefore must be cautious in their business decisions.

6.6.2.3 Opportunities

There are a number of developments that can serve as opportunities for firms in Atlantic Canada.

Development of ITS Standards

The ITS industry is maturing. For many years the systems were proprietary in nature. Therefore once a system was implemented, the company that supplied the system had exclusive access to that client. However, from a client perspective, this has been seen as a major problem since it limited competition, and prevented integration and communication with related systems. Over the past decade, there has been a concerted effort to develop ITS standards. The best known effort is the National Transportation Communications for ITS Protocol (NTCIP), to provide an open communications standard that ensures the interoperability and interchangeability of ITS devices. As these standards are completed, new market entrants can design their devices to meet these standards.

Funding

There has been sustainable funding for ITS, as evidenced by the ISTEA and TEA-21 programs for the past decade. Therefore ITS providers, and potential ITS providers can be confident of an ongoing stream of funding for ITS projects. These funding sources have been identified in Exhibit 6.13.

Canadian ITS Success Stories

Atlantic Provinces firms may wish to consider seeking partnerships with complementary firms in Canada to deliver showcase projects, and to use the experience and the profile to then access external markets.

There are existing Canadian firms that have participated in Canadian showcase projects, and then developed channels to access the international market. Examples include:

- Siemac has developed advanced, lower cost commercial fleet tracking solutions using Canadian marine satellite (MSAT) technology and is actively marketing in the U.S.;
- Ledstar, an electronic variable message sign (VMS) vendor based in Toronto developed advanced LED displays for COMPASS in Toronto, and has grown to be one of the leading VMS manufacturers in the U.S. market;
- IBI Group developed freeway traffic management software (the RESCU system) for the City of Toronto. The software has been marketed to, and adapted for projects in Connecticut, and in Western New York (NITTEC);
- Delcan developed freeway traffic management software for COMPASS in Toronto, and has since marketed and applied their systems in the U.S. and Asia-Pacific.

For the firms that are already familiar with ITS technology, they can pursue opportunities to apply that technology to other fields. A good example is Approach Navigation Systems (ANS), a small firm operating in Dieppe, New Brunswick, which is profiled in Appendix Q. ANS is an integrator, assembler, installer, and project engineer for RWIS and related systems, which is primarily deployed on road networks. However, they have pursued the application of RWIS pavement monitoring technology for airport runways.

Canada's low cost base combined with free trade has proven to be an opportunity for industry. Canadian companies have leveraged off the cheaper dollar with great success. An example of this is Variable Message Signs, with Canadian-produced signs prevalent in the U.S. market. The high tech nature of the ITS industry renders it consistent with provincial strategies to diversify their economic base from traditional economic sectors.

KPMG's annual competitiveness study (http://www.competitivealternatives.com/main.htm), a comparison of business costs in North America, Europe, and Japan, ranked Canada as an overall cost leader for 2002 with a cost index of 85.5, a 14.5 percent cost advantage over the US (US=100). Cost indices were even more favourable for several Atlantic Canada cities including Moncton, Charlottetown, Truro, and St. John's.

Other Support Resources

There are some Canadian organizations available to support firms who wish to access the world market. These include:

- ITS Canada [www.itscanada.ca] and Trade Team Atlantic which, among other things, organizes trade missions where firms have a chance to identify opportunities abroad;
- CIDA (Canadian International Development Agency) [www.acdi-cida.gc.ca], which offers funding for work in developing markets;
- Export Development Corporation (EDC) [www.edc.ca], a Crown corporation that facilitates Canadian exports by providing loan guarantees for financing; and
- Transport Canada's International Cooperation Branch that facilitates and coordinates Canadian expertise working in overseas markets.

There are many other resources that Atlantic Region firms can use to access information on the ITS industry. There is a wealth of periodicals, professional associations, and conferences which provide information on the projects, the technologies, and the participants.

There are a number of Canadian and International Associations that provide information and education in ITS. These include: ITS Canada, CTRF, TAC, ITE and CITE.

ITS Canada (www.itscanada.ca) promotes the application of ITS technologies by increasing awareness of the benefits and strategic importance of ITS, facilitating information exchanges through workshops and conferences, providing a national focus for development of Canadian standards and participating in international standards process, providing input to government agencies on policy, funding and ITS delivery, and by facilitating training for ITS users, operators, and young professionals. ITS Canada has a committee dedicated to Education and Training. In addition to providing information on which Canadian institutions offer some level of education in ITS, the committee also offers a training course in ITS Architecture.

The **Canadian Transportation Research Forum (CTRF) (www.ctrf.ca)** is an association for Canadian transportation professionals who work for public and private owner/operators or academic institutions. At the CTRF's Annual Conference, papers are presented from a wide range of industry, government and academic perspectives. A typical Annual Conference includes sessions on: airline regulation; national railway policy; logistics; motor carrier issues; new directions in transportation policy; marine transportation issues; ports policy; financing strategies; transportation and regional economies; education; grain transportation; safety and operations; cost recovery; modeling; system management; and trade and transportation. CTRF publishes these papers in a Proceedings book for its members and other interested parties. ITS applications are reflected in many of these topics.

Transportation Association of Canada (TAC) (www.tac-atc.ca) is a non-profit association of transportation stakeholders in government, industry and educational institutions. TAC offers a neutral forum for gathering and exchanging ideas, information and knowledge in support of technical guidelines and best practices. TAC deals with ITS through the Traffic Operations and Management Standing Committee. The committee is currently comprised of members from provincial and territorial governments, the federal government, municipal governments, relevant Canadian associations, educational institutions, and private sector companies. This committee deals with the development of traffic control devices, applications and practices. In the past few years, ITS has played a more prominent role in the development of traffic control devices. The annual conference and exhibition includes sessions specifically dealing with ITS.

The **Institute of Transportation Engineers (ITE) (www.ite.org)** is an international individual member educational and scientific association with over 15,000 members worldwide. ITE has over 11 area-of-interest councils that serve as forums to define issues and develop solutions. More than 100 activities are currently underway including the development of standards and recommended practices, informational reports and handbooks. ITE also offers educational and professional development opportunities to members. Through the councils, ITE holds regional and international conferences, exhibits, and seminars that draw hundreds of members and regional players.

The **Consortium for ITS Training and Education (CITE) (www.citeconsortium.org)** is a unique organization of universities, associations, and private sector members focused on providing comprehensive ITS (Intelligent Transportation Systems) training and education. CITE has developed a number of interactive web-based courses geared to graduate students and current professionals who wish to enhance their knowledge and skills in ITS. Graduate level for-credit courses developed by CITE are offered through CITE member universities. Training courses for continuing education units are available directly through CITE. The Canadian academic institutions that are members of CITE, and offer the ITS courses include Dalhousie University, University of Toronto, Carleton University, and University of Calgary.

The International ITS Index is a reference manual, most recently published in 1999, that contains over 1800 profiles of ITS participants in North America, Europe, and Asia-Pacific. It therefore serves as a valuable reference manual for private sector firms that wish to enter, or have entered the ITS market. The participant profiles include a description of the products and services, technologies deployed, project involvement and corporate background, as well as contact information.

A sampling of the participants that can present opportunities in North America includes:

ITS America, based in Washington, D.C., was mandated by the U.S. Congress in 1991 to coordinate the development and deployment of intelligent transportation systems in the United States.

The ITS JPO is based in Washington, D.C. It provides strategic leadership for the U.S. Department of Transportation's ITS Program in the areas of program planning, budgeting, outreach, system architecture development, program evaluation, and institutional and mainstreaming issues. This agency recently released an important reference manual titled "ITS/Operations Resource Guide 2002". It provides information on documents, videos, websites, training courses, software tools, and points of contact for ITS.

Transportation Research Board (TRB) is based in Washington, D.C. The TRB manages a program titled "Ideas Deserving Exploratory Analysis" (IDEA). The IDEA program has an ITS component (ITS-IDEA) that focuses on demonstrating new and innovative products and methodology for ITS applications, including highway systems and safety, intermodal systems, and high speed rail systems. It solicits proposals for innovative concepts that will have an impact in any of the ITS user service areas.

The International Bridge, Tunnel and Turnpike Association (IBTTA) is based in Washington, D.C. It represents toll bridges, tunnel and turnpike authorities in 22 countries. Its members include more than 85 toll authorities and agencies, operating more than 300 toll facilities worldwide.

The National Electrical Manufacturers Association (NEMA) is based in Virginia. Members of the association are national and international manufacturers of electrical and electronic products. The mission of the NEMA Transportation Management Systems and associated Control Devices Section is to originate and participate in the creation, maintenance, promotion and implementation of national standards for transportation systems and devices.

There are also a number of web-based news groups that provide information on ITS activities. An example is the Transportation Communications Newsletter, which is published daily. A free subscription can be obtained by sending an e-mail message to: transport-communications-subscribe@yahoogroups.com

6.6.2.4 Threats

The threats to Atlantic Provinces can be primarily categorized by the barriers to entering the ITS market. The main barriers are the public sector procurement processes, and the strength of the firms already in the ITS market.

Public Sector Procurement Processes

In each province or state, there can be specific requirements of firms providing services in a state. For example, in the state of Michigan, all principals of a firm must be registered as professional engineers in that state. Many U.S. cities require the proponents to include designated Disadvantaged Business Enterprises ("DBE's") on their teams. DBE's are firms that are owned by, or have a significant proportion of employees, that are categorized as disadvantaged, based on gender, ethnic background, and other criteria. Finally, in many jurisdictions, the proponents must be pre-qualified in order to be eligible to submit bids to provide services.

The barriers listed above are the formal barriers. Firms must also deal with a parochial culture, whereby local firms are generally favoured based on familiarity, and also to promote the local economy. It can take considerable time and effort to deal with these barriers.

Positioning of Existing ITS Service Providers

Another major barrier to Atlantic Canada firms that wish to enter, or have entered the ITS market is the strength and positioning of the existing ITS service providers.

One method of assessing the threat posed by these ITS participants is to examine the strength of participants by ITS category, and by geographic region. For this exercise, the focus is on North America. In addition, Canadian players which would be vying for the same North American market opportunities are noted. Most of the companies as noted do not have a permanent presence in Atlantic Canada.

In order to obtain information on the existing ITS service providers, there are some published reference documents. An prime resource document is the International ITS Index, which is a reference manual, most recently published in 1999, that contains over 1800 profiles of ITS participants in North America, Europe, and Asia-Pacific. It therefore serves as a valuable reference manual for private sector firms that wish to enter, or have entered the ITS market. The participant profiles include a description of the products and services, technologies deployed, project involvement and corporate background, as well as contact information.

Information from the International ITS Index, as well as information from other sources, has been used to provide representative profiles on the strength of the competition in many of the ITS areas of business.

Traveller Information Systems

TRAVEL AND TRAFFIC INFORMATION PROVIDERS

Major players include SmartRoute Systems, Metro Networks, and Surface Systems Inc.

Significant consolidation has occurred in this sector over the past three years. Westwood One supplies radio and television stations with information services and programming. It is the largest U.S. outsource provider of traffic reporting services and the largest radio network. In 1999, it merged with Metro Networks, and in 2000 it acquired the operating assets of SmartRoute Systems. Westwood One is present in 80 of the largest U.S. markets.

Surface Systems Inc. is the world's leading full-service weather information provider for the transportation and utilities industries. SSI established the world's first meteorological centre dedicated to providing pavement specific weather forecast information. The SSI Weather Centre provides weather forecasting and decision support for over 500 localized forecast sites in 45 U.S. states, using proprietary forecast models and methods.

NAVIGATION AND ROUTE PLANNING

The participants can be loosely grouped. One group consists of companies that have a long history of providing in-vehicle audio systems, including Alpine, Clarion, Delphi Delco, Pioneer, and Sony. Others are firms with a more direct ITS focus, such as Motorola and Siemens ITS North America.

Motorola is a global leader in providing integrated communications solutions and embedded electronic solutions, with 150,000 employees worldwide. One of its many business sectors produces integrated electronic systems for automotive applications.

MAP DATABASE VENDORS

The notable players include ETAK, MapInfo, ESRI, and Navigation Technologies Inc.

ETAK is now known as Tele Atlas North America, a division of Tele Atlas. Tele Atlas claims to be a worldwide leading provider of digital map data, offering the broadest map coverage of the world, and delivering the most accurate, complete and current digital maps available from any single source. Its head office is in the Netherlands.

MapInfo is also a global company, headquartered in Troy, New York, with more than 600 employees worldwide including subsidiaries in Canada, the UK, Germany, Australia and Japan. Its primary product is location information, including names, addresses, routing directions and traffic patterns.

ESRI is the privately-owned maker of ArcView and ArcInfo as well as a series of other GIS products. With a presence in the field dating before ArcInfo's first commercial release in 1981, ESRI has grown to more than 2,500 employees. Over half of these (1,400) are based in Redlands, California, the company's world headquarters.

Navigation Technologies is a global company, headquartered in Chicago, with 100 field offices in 18 countries. It is a leading provider of digital map information and related software and services used in a wide range of navigation, mapping and geographic-related applications, including products and services that provide maps, driving directions, turn-by-turn route guidance, and fleet management and tracking.

Traffic Management

TRAFFIC MANAGEMENT SYSTEMS

Participants that have not been previously profiled include Peek Traffic Systems, Inc, based in Florida, and Safetran Traffic Systems, Inc. based in Colorado. Major participants that are not profiled include Econolite Control Products, Inc. based in California. Canadian participants include Delcan, IBI Group, and Fortran Traffic Systems, which are all based in Ontario.

VARIABLE MESSAGE SIGNS

Some of the better known manufacturers include Daktronics, Inc, Ledstar, Inc., and Skyline Products, Inc.

Daktronics, Inc. is based in South Dakota. It designs, manufactures, sells and services dynamic visual communication systems for customers worldwide. Daktronics has installed tens of thousands of scoreboards and display systems in more than 70 countries, and is recognized as a world leader in arena and stadium scoring systems.

Skyline Products, Inc. is based in Colorado. It manufactures and installs light emitting diode (LED) variable message signs on urban freeways, rural highways, and in trailblazing systems.

Canadian participants include Groupe Infocite Inc. of Quebec, Ledstar, Inc. of Ontario, and Mark IV Industries, of Ontario.

Groupe Infocite produces LED variable message signs for highway management systems and all modes of transportation terminals.

Ledstar Inc. pioneered the LED based Variable Message Sign with North America's first system installed in Toronto, Canada in 1991. Ledstar is at the forefront of LED technology Variable Message Signs, with clients across North America.

Mark IV Industries is profiled under *Electronic Toll System Integrators.*

TRAFFIC DETECTORS AND OTHER SENSORS

Some of the major players include 3M Intelligent Transportation Systems, Cohu Electronics Division, Image Sensing Systems, Inc., Microwave Sensors, Inc., and Nu-Metrics. There are a number of significant Canadian players, including EIS Electronic Integrated Systems, Inc., International Road Dynamics (IRD), and Novax Industries Corp.

3M Intelligent Transportation Systems, based in Minnesota, uses optical communications to provide temporary priority for emergency vehicles and transit vehicles at signalized intersections. It also markets an integrated fleet operations system, traffic signal equipment, and magnetic lateral warning and guidance tape to be used in vehicle safety control systems.

Cohu, Electronics, based in San Diego, provides closed circuit television surveillance systems. Image Sensing Systems, based in Minnesota, produces the well-known Autoscope wide area vehicle detection system. Microwave Sensors, Inc., based in Michigan, produces microwave and ultrasonic vehicle and pedestrian detection systems. Nu-Metrics, based in Pennsylvania, manufactures portable and permanent traffic counters.

EIS, based in Ontario, manufactures and distributes Remote Traffic Microwave Sensor (RTMS) units for traffic management systems and traveller information systems.

International Road Dynamics is based in Saskatoon, Saskatchewan. IRD describes itself as a multi-discipline, technology company with the expertise to integrate complementary ITS technologies. IRD offers multi-systems solutions by integrating a number of different technologies to the desired functionality. Its products include Traffic Data Collection Systems, Automated Truck Weigh Stations / Commercial Vehicle Operations, Driver and Fleet Management Systems, Automated Toll Systems, and Traffic Safety and Advisory Systems.

Novax Industries Corporation, based in British Columbia, manufactures and distributes microwave detectors, as well as traffic signal controllers, audible pedestrian signals, and transit vehicle priority equipment.

Public Transport/Commercial Vehicle Operations

VEHICLE POSITIONING SYSTEMS/AVL

The notable participants include Motorola, and Qualcomm Inc.

Qualcomm Inc. is headquartered in San Diego, California. It offers products such as QTRACS and OmniTRACS. The OmniTRACS system now provides mobile communications, position location and logistics management support for over 400,000 vehicles in 32 countries.

There are three Canadian firms of note listed. The first firm is Research in Motion Limited, based in Waterloo, Ontario. A second firm is AVeL-Tech, Inc. a private company located in Laval, Quebec. AVeL-Tech markets an Automatic Vehicle Location (AVL) system. Finally, AVL Systems Ltd. was founded in 1987 in Calgary. AVL Systems Ltd. is a systems integration company focused on the business of designing and implementing automatic vehicle location systems for a variety of applications, most of which are in the broad areas of fleet management and safety/security. Since 1996, AVL Systems has carried out projects involving ships, locomotives, ambulances, snow plows, helicopters, tanks, and a variety of commercial and military vehicles.

FLEET MANAGEMENT SYSTEMS

The major players include Qualcomm, HELP – Heavy Vehicle Electronic License Plate Inc., Lockheed Martin IMS and Roadnet Technologies Inc.

HELP, Inc. is a non-profit corporation based in Phoenix, Arizona that works with the transportation industry in nine states to develop and implement technology services to benefit motor carriers.

Lockheed Martin IMS is headquartered in Washington, D.C. It is a partner with HELP, and operates the PrePass weigh station bypass service, which allows commercial vehicles to be weighed at highway speeds and have their credentials checked without stopping, on behalf of HELP.

Roadnet Technologies, Inc., is a United Parcel Service Logistics Group company located in Maryland. It produces software packages that, for example, compute least-cost routes for commercial vehicles.

Electronic Payment Services

ELECTRONIC TOLL SYSTEM INTEGRATORS

Major players include Amtech Transportation Systems Group, Lockheed Martin IMS, and TransCore. There are a number of major Canadian-based participants, including Mark IV Industries, Inc. and SIRIT Technologies, Inc.

TransCore Inc. is a company with 1800 employees distributed at more than 80 locations throughout the world. They specialize in the supply of toll collection systems, commercial fleet management systems, and traffic management and traveller information systems. They have pursued a growth strategy through the acquisition of four transportation service companies, including Amtech Transportation Systems.

Lockheed Martin is a global company with over 125,000 employees, principally engaged in the research, design, development, manufacture and integration of advanced technology systems, products, and services for government and commercial customers.

Mark IV Industries is based in Ontario. Mark IV IVHS, supplies the majority of Electronic Toll Collection (ETC) equipment in the Northeastern United States. It is the largest supplier of its kind in North America. The E-ZPass^{sm} system - which relies on Mark IV transponders, is the largest and most successful intelligent transportation system (ITS) implementation in the world. Mark IV IVHS has supplied systems for Canada's Highway 407, and for border crossing projects. Mark IV also markets commercial vehicle operations systems, dynamic message signs, as well as parking and transit systems.

SIRIT Technologies Inc., headquartered in Ontario, is an international company that facilitates business-to-consumer transactions using innovative wireless technologies. SIRIT is a worldwide leader in Automatic Vehicle Identification (AVI) solutions for toll road users, a parking lots, and commercial vehicles.

Other ITS Service Providers

CONSULTANTS

The ITS Index lists close to 200 consultants ITS services in North America. There are generally two categories of ITS consultants. The first type are ITS specialists that are active in all parts of North America, and in most if not all areas of ITS. An example is TransCore. The second type are regional civil engineering firms that have some ITS project experience. These regional firms can be converted to opportunities if they are used as a local presence for teaming purposes.

TRANSPORT RESEARCH FACILITIES

There are many transport research facilities in the United States, and they receive millions of dollars of funding annually. Some of the better known facilities include the Volpe National Transportation Systems Center, located in Massachusetts, and Mitretek Systems of Washington, D.C.

UNIVERSITIES

The ITS Index lists 57 participants category, including seven Canadian institutions. The Canadian institutions include Carleton University, Concordia University, Mohawk College, Royal Military College of Canada, University of Montreal, University of Calgary, University of New Brunswick and the University of Victoria.

A prominent university that performs ITS research is the Texas Transportation Institute, which is part of the Texas A & M University System.

In summary the major participants in ITS are very large firms with international experience. In many cases, ITS is only one of many areas of business. Therefore, these firms are able to take advantage of economies of scale in conducting research and development, manufacturing, and delivering and supporting their products.

In light of the size of the existing sector participants, firms in the Atlantic Region might look to developing innovative approaches that might be of interest to the major players, or serving in a local support role.

6.6.2.5 Relevance Map

The ITS Relevance Map is an technique used to identify key areas in which the Atlantic Region has ITS capabilities, and for which there is a significant market pull. It deals with three fundamental dimensions of relevance: Products, Processes, and Players. These are combined in two combinations: products vs. players, and products vs. processes. Each of these dimensions is broken down into its components, and when crossed, a matrix is formed to capture the interactions. The ITS Relevance Map technique involves responding to the following questions for the cells in the matrices:

1. How much is the Atlantic Region doing now in this area of ITS?

2. How good is the region at this now?

3. Considering the ITS marketplace, what is the potential for Atlantic Canada players to increase their market presence?

The results are scaled from 1-5, with 1 being the worst and 5 the best. A '-' indicates an insignificant amount of work has been done to date. Using an equal weighting of the three questions to determine a group average, we obtain a quantitative comparison of which sectors of ITS are the best suited for the Atlantic Canada Region.

Exhibit 6.19 – Product vs. Players Matrix

		Traveller Information Systems			Traffic Management Services			Public Transport Services			Electronic Payment Services			Commercial Vehicle Operations			Emergency Management Services			Vehicle Safety and Control Systems			Information Warehousing Services		
Player	Sector	q1	Q2	q3	q1	q2	q3	q1	q2	q3	q1	q2	q3	q1	q2	q3	q1	q2	q3	q1	q2	q3	q1	q2	q3
Owners/ Operators	Public	2.5	2.5	3.5	2.5	3	2.5	3	3	2.5	-	2	3.5	1.5	2	3	2	2.5	2	-	-	-	2	2.5	-
	Private	-	-	-	2	3	2	-	-	-	3.5	3.5	3	3	3.5	4	-	-	-	-	-	-	-	-	-
Research/Academia		-	-	-	1.5	2	2.5	-	-	-	-	-	-	-	-	3	-	-	-	1.5	2.5	1.5	-	-	-
Provider	Surveillance	1	1	1	2.5	2.5	2.5	-	-	-	-	-	-	2.5	3.5	4.5	-	-	-	-	-	-	-	-	-
	Data Processing	2	2	3	2	2	2	2	2.5	2	2.5	2.5	2.5	3	3	3	2	2.5	2	-	-	-	2	2.5	2.5
	Control	-	-	-	1.5	2.5	1.5	2.5	2.5	2.5	1	2	1	2.5	2.5	2.5	2	2	2	-	-	-	-	-	-
	Traveller Interface	1	1.5	2.5	1.5	2.5	1	1.5	2	2	2	2.5	2.5	2	2	2	-	-	-	-	-	-	-	-	-
	Navigation	1	3	1	1	3	3	1	2	3	-	-	-	2	2.5	2.5	-	-	2.5	-	-	-	-	-	-
	In-Vehicle Sensors	-	-	-	-	-	-	1	2	2	1.5	2.5	1	2.5	3	3.5	-	-	-	1.5	3.5	2	-	-	-
	Communications	2.5	2.5	2	2	2	2	2	2	2	2	2.5	2.5	3	3.5	4	3	3	3	-	-	2.5	-	-	2
	Provider Average	1.5	2	1.9	1.7	2.4	1.9	1.7	2.1	2.1	1.8	2.4	1.8	2.3	2.7	3.0	2.2	2.4	2.3	1.3	3.3	2.3	2	2.5	2.3
	Average	1.6	2.1	2.1	1.8	2.5	2.0	1.8	2.2	2.1	2.1	2.4	2.2	2.3	2.7	3.1	2.2	2.4	2.2	1.4	2.8	2	2	2.5	2.3
	Group Average	1.9			2.1			2.1			2.3			2.7			2.3			2.1			2.3		

Exhibit 6.20 – Product vs. Function Matrix

	Traveller Information Systems			Traffic Management Services			Public Transport Services			Electronic Payment Services			Commercial Vehicle Operations			Emergency Management Services			Vehicle Safety and Control Systems			Information Warehousing Services		
ITS Related Functions	q1	q2	q3	q1	q2	q3	q1	q2	q3	q1	q2	q3	q1	q2	q3	q1	q2	q3	q1	q2	q3	q1	q2	q3
R&D	-	-	-	2	2.5	2	-	-	-	-	-	-	2	2	2.5	1	2	1	1.5	2.5	2.5	-	-	-
Pilot-Projects/Demonstration	1	-	-	2	-	-	2	2.5	3	2	-	-	1.5	2	2.5	1	-	-	-	-	-	1	-	-
Market Introduction	2	1	2	3	3	-	2.5	2	2	3	3	3	3	3.5	2.5	1.5	-	-	-	-	-	-	-	-
Market growth/penetration	1	1	1.5	2	2.5	3	1.5	1.5	2	2.5	2	3	2.5	3	2.5	1	1	-	-	-	-	-	-	2
Average	1.3	1	1.6	2.1	2.6	2.5	1.8	1.9	2.3	2.3	2.3	2.9	2.2	2.4	2.4	1.1	1.5	1	1.5	2.5	2.5	1	-	2
Group Average	1.3			2.4			2.0			2.5			2.3			1.2			2.2			1.5		

In Exhibit 6.19, Product vs. Players Matrix, the activity and the potential for Atlantic Canada players to increase their market presence, is below average (below a score of "3") for all eight user service bundles. This can be attributed to the relatively small size of the Atlantic Canada ITS market, and the small size of the firms with ITS, or ITS-applicable experience. The highest rated user service bundles are Commercial Vehicle Operations, and Electronic Payment. This reflects the activity by firms such as Seimac Limited, and the number of electronic payment facilities present in Atlantic Canada, for example. They are also the user service bundles with the greatest potential for growth.

In Exhibit 6.20, Product vs. Function Matrix, once again all eight user service bundles are scored as below average. The rows reflect typical step in the product cycle process. It can be seen that a relatively small amount of research and development and pilot projects are being conducted in the Atlantic Region. More of the activity is based on implementing actual systems.

The highest ratings are found in Electronic Payment Services, Traffic Management Services and Commercial Vehicle Operations. This reflects the fact that the Atlantic Region has a number of "mature" systems in place in each of these areas.

6.6.3 Market Summary

The ITS market analysis yields the following observations:

- The three largest international markets are the United States, Europe and Japan.
- Whereas the U.S. program emphasizes planning and deployment, Europe and Japan weight their funding more toward research and development.
- Canada has historically been at the forefront of ITS deployment, with the focus on Advanced Traffic Management Systems, Commercial Vehicle Systems, Commercial Fleet Management, and Advanced Public Transportation Systems.
- Many examples of successful Canadian firms active and well respected on the world stage.

- The development of ITS architecture in the major deployment centres implies a more standardized, less 'built-to-spec' approach. Although this means a lower profit margin, the deployment volume will increase.

- There is a diverse set of sources from which Atlantic Canada can obtain funding assistance for the different projects identified as having potential in the Strategic Plan.

- Historically at the forefront of ITS deployment, Canada could lose its competitive advantage without a commitment for further investment from the Federal Government. The ITS Plan for Canada gives scope to the different activities that Transport Canada will undertake to promote development, but does not formalize a long-term fixed funding mechanism.

- The United States government has invested substantially in ITS deployment over the past decade, most recently with NEXTEA's $1.3 billion (USD) from 1998-2002. From this, over half of the funds have been used for rural ITS projects. In addition, funding of small urban centres was at a comparable level to large urban centres.

- Although Japan invests significant funds toward ITS, there is a low level of international participation. Non-Japanese companies have had little success outside of niche areas.

- Under Framework Six, Europe will be investing $2 billion (Euros) for research and overall coordination efforts of ITS projects between member states.

- Emerging markets in developing countries can often present opportunities to Canadian companies. Latin America and Southeast Asia are the most promising, with the Indian sub-continent and Eastern Europe also showing potential.

- Traveller Information Services, Traffic Management Services, Public Transport Services, and Commercial Vehicle Operations are the User Service Bundles with the most established providers in the Atlantic Canada Region.

- Road Weather Information Systems, Infrastructure Maintenance Management, Transit Vehicle Tracking, Transit Fixed-Route Operations, Freight In-Transit Monitoring, Fleet Administration and Emergency Response Management are niche areas that Atlantic Canada is well positioned to increase its market share.

- The primary weakness of most Atlantic Region firms is size. Given the size of the firms, and their resources, it is important for the firms to make educated business decisions about which opportunities should be pursued. Firms should focus on selecting niches within the ITS industry. Ideally, they will select niches in which they can take advantage of transfers of technology from other business sectors to the ITS sector.

- The development of standards permits Atlantic firms to develop ITS products. There are lessons learned from other successful Canadian ITS firms. There are numerous supporting services and institutions for firms seeking to expand their work to ITS. This includes but is not limited to ITS Canada, CIDA, Transport Canada, established cores competencies in courseware and e-learning applications, customer contact centres and telecommunications, as well as Academic and Research Centres.

- The Relevance Map technique identified Commercial Vehicle Operations, Electronic Payment Services and Traffic Management Services as the three User Service Bundles that the Atlantic Region best stands to gain a market share of.
- The primary challenge to developing the ITS industry is helping Atlantic Canada firms overcome some of the disadvantages they face from their small size and limited experience.

This document contains many tools for ITS firms and potential ITS firms to develop a business plan. Firms can start by checking the key enabling technologies mapped to the higher priority user services in Appendix R. They can then identify local applications by reviewing the project profiles summarized in Section 5.1.3. If they wish to look to the U.S. in the short term, then Appendix T presents the U.S. program.

6.7 RECOMMENDATIONS

Public Sector

There are measures which the industry participants can undertake to help develop the ITS industrial base in Atlantic Canada: The federal and provincial and municipal governments should continue to promote ITS showcase projects in Atlantic Canada, and these initiatives should include an evaluation component. For example, any recommendations from the Atlantic Provinces Regional ITS Strategic Planning Study that promote ITS deployment in the region will also promote economic development in the region.

Governments should raise awareness and promote education in appropriate fields to engage latent capabilities of the region. This includes encouraging and funding showcase projects, liaison with clusters and IT associations, incorporation of ITS into the traditional transportation planning framework, and promoting ITS as a viable solution to transportation-related environmental, economical, and performance concerns.

The Transport Canada ITS research and development program should be active in its role to bring private sector and academic institutions together to develop ITS products, in the Atlantic context.

Industry Canada should develop a strong association with ITS Canada, and cooperate on initiatives such as international trade missions.

The federal and provincial governments should undertake to increase the profile of ITS industry opportunities within existing infrastructure development programs.

The research intensive nature of the ITS industry and the small size of the ITS firms comprising the industry in Atlantic Canada suggests that public sponsored R&D incentive programs (e.g., enhanced R&D tax credits, etc.) should be considered by government as options for stimulating R&D investment and hence developing the ITS industry. Aside from encouraging more private sector R&D spending, government should facilitate increased R&D collaboration between industry and academia in an effort to optimize R&D investment.

In organizing and promoting ITS workshops and conferences, government departments and ITS organizations should work to ensure events are communicated to appropriate individuals involved in economic development as well as to those individual involved in the deployment aspect. This would involve communication among and between departments with transportation mandates and departments with economic development responsibilities, both at the federal and provincial levels.

Private Sector

ITS information sources are provided throughout the document. The existing ITS firms are presented as threats, but they could be converted to opportunities if appropriate partnerships are developed. Funding sources can be contacted prior to program announcements, in order to prepare submissions, or develop ideas for projects to be proposed to potential clients.

The firms should begin to track funding opportunities, with an initial focus on the Canadian market. They should pursue working relationships with established Canadian ITS firms. Through these working relationships, they should pursue Canadian projects to serve as showcase opportunities.

With respect to the U.S. market, they should seek working relationships with both the large ITS firms, and the regional civil engineering firms with ITS experience.

In the case of the large ITS firms, the focus should be on marketing unique ITS, or ITS-related products or services, that could be offered to clients as part of larger packages. Firms should concentrate on the niche areas as identified in Section 6.3.

In the case of regional civil engineering firms with ITS experience, the Atlantic Provinces firms can offer technical skills and products in niche areas, in exchange for the access to local markets offered by the regional civil engineering firms.

Academia

The academic institutions should explore the possibility of becoming a Centre of Excellence for ITS education and research. The University of Toronto has established an ITS testbed, however, the focus is more on urban applications. An Atlantic Region academic institution could instead focus on area strengths such as geomatics, and area needs, such as rural ITS applications. Given their current activity in ITS work, a potential lead potential candidate would be the University of New Brunswick.

The model for creating the Centre of Excellence should include partnerships with private sector firms. Private sector firms through cost contributions, can sponsor ITS research and development activities. These activities in turn provide students with the training to supply the private sector firms with the necessary skilled labour.

Academic institutions should provide programs which reinforce the skill sets required by the ITS industry including transportation/traffic engineering, traffic operations, logistics, information technology, software development, telecommunications, and system integration.

Collaborative Effort

Many of the actions as noted above emphasize the need for industry sectors to work together. Collaborative initiatives which engage the public, private and institutional/academic sectors play an important role in accessing new markets. Existing entities such as ITS Canada, and various regional clusters, IT associations, etc. should help to reinforce the opportunities as set forth in this analysis through outreach to the stakeholder community. A specific opportunity is the ITS Canada Annual General Meeting planned for Fredericton in April 2003. All parties are encouraged to learn more about ITS Canada and consider the benefits of membership. Ongoing collaborative efforts should be directed through the efforts of the ITS Roundtable, and provide a continued forum for information exchange using tools such as the current *www.itsatlantic.com* web portal.

6.8 REFERENCES

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7. NEXT STEPS

The Strategic Planning process has been critical in terms of engaging stakeholders, rationalizing needs, and developing strategic action items for advancing the applicable ITS solutions. It should be emphasized that the plan extends beyond the strategic perspectives and identifies specific action items and a series of projects. This underscores the need to set in place and maintain a regional program to oversee the follow on activities. It is recommended that, under the direction of the Council of Atlantic Premiers, the project Steering Committee Group remain in tact beyond the course of the project to fulfil a number of functions including:

- Ongoing engagement of the stakeholder community through the ITSAtlantic.com portal and various meeting forums in an effort to oversee the enactment of strategic action items to address institutional considerations;

- Provide oversight and coordination in the definition and undertaking of projects contributing to the deployment plan;

- Provide an ongoing monitoring role to track progress against the plan.

It is important that the ITS community in the Atlantic Region maintain this common point of reference, and common representation to other industry participants such as Transport Canada and the I-95 Corridor Coalition.

In conclusion, the plan has taken the initial steps in terms of engaging the stakeholders and undertaking analysis; the emphasis is on continued involvement and actions among the stakeholders at the strategic and deployment level, under the stewardship of the Steering Committee.

APPENDIX A

Stakeholder List

Appendix A – Stakeholder List

Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
Adtech Manufacturing Ltd.	NB	PO Box 3772, Stn. B, Fredericton NB E3A 5L8	Bill Chamberlain, Operations Manager	506-452-0891	506-452-0126	adtech@nbnet.nb.ca
Advanced Business Services Ltd.	NB	800 Hanwell Road, Suite C, Fredericton NB E3B 2R7	Stephen Murray	506-452-9820	506-452-0551	absadmin@abs.ca
Advanced Monitoring Technologies	NB	127 Rocky Road, Keswick Ridge, NB E6L 1V1	Ernie Adsett	506-363-3069	506-363-3068	ernie@amt.nb.ca
Advatek Systems Inc.	NB	PO Box 966, 1560 Main Street, Moncton NB E1C 8N8	Terry LeBlanc	506-858-9271	506-857-0909	advatek@nbnet.nb.ca
Anyware Group Inc.	NB	15 Market Square Suite 1602, Saint John NB E2L 1E8	John Gaudet, Dir. of Sales	506-643-6605	506-643-6600	john.gaudet@anywaregroup.com
Approach Navigation System	NB	409 Dieppe Blvd., Dieppe NB E1A 6P9	Brian Ahern	506-854-0030	506-854-2967	bahern@approach.nb.ca
Armour Transport Ltd	NB	689 Edinburgh Dr, Moncton E1E 2L4	Angus Armour	506-859-9339	506-857-0205	aarmour@armour.ca
Atlantic Canada Opportunities Agency (ACOA – APECA) – Head Office	NB	Blue Cross Centre, 644 Main St, PO Box 6051, Moncton E1C 9J8	David Slade, Director – General, Policy	506-851-7403	506-851-6141	dslade@acoa-apeca.gc.ca
Atlantic Canada Opportunities Agency (ACOA – APECA) – New Brunswick Office	NB	570 Queen St, PO Box 7303, Fredericton E3B 5A6	Victor Paul-Elias, Policy Analyst	506-452-3285	506-452-3037	VElias@acoa-apeca.gc.ca
Atlantic Provinces Chamber of Commerce	NB	236 St George St, Suite 110, Moncton E1C 1W1	Sean Cooper, Executive Director	506-857-6131	506-857-3980	apcced@auracom.com
Atlantic Provinces Trucking Association	NB	407 Dieppe Blvd, Dieppe E1A 6P8	Ralph Boyd, President	506-853-7424	506-866-1679	rboyd@apta.ca
Belledune Port Authority	NB	261 Shannon Drive, Belledune, NB, E8G 2W1	Captain Wynford Goodman Director of Operations	506-522-0803	506-522-1201	goodman@portofbelledune.ca
Brookville Carriers Inc – Sales & Marketing	NB	Spruce Lake Industrial Park, 66 Alloy Dr, PO Box 3039 Stn B, Saint John E2M 5Z9	John Travis, Vice President	506-634-5614	506-633-7555	sales@brookville.ca
Business New Brunswick - Knowledge Industry & Technology	NB	Centennial Bldg, PO Box 6000, King St, Fredericton E3B 5H1	Len Weeks, Manager	506-453-4845	506-453-2727	len.weeks@gnb.ca

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Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
Calais-St Stephen Area International Border Crossing Public Advisory Committee - New Brunswick Department of Transportation	NB	PO Box 6000, 670 King St, Fredericton E3B 5H1	Brian McEwing, Director Planning & Land Management	506-444-5207	506-453-2754	brian.mcewing@gnb.ca
Canada Customs			Austin MacPhee		506-636-5595	Austin.Macphee@ccra-adrc.gc.ca
Canadian Automobile Association - CAA Maritimes	NB	737 Rothesay Ave, PO Box 310, Saint John E2L 3Y2	Steve McCall, President	506-653-9500	506-634-1400	smccall@caa.maritimes.ca
Canadian Manufacturers & Exporters, NB Division	NB	Suite 420, 1133 St. George Blvd. Moncton, NB, E1E 4E1	Blain Lewis, Vice President	506-857-3059	506-857-3056	nb@cme-mec.ca
CARIS Universal Systems	NB	264 Rookwood Ave., Fredericton NB E3B 2M2	Heather MacLean	506-459-3849	506-458-8533	info@caris.ca
City of Fredericton - Development Services	NB	397 Queen St, PO Box 130, Fredericton E3B 4Y7	Frank Flanagan, Director	506-460-2126	506-460-2028	frank.flanagan@city.fredericton.nb.ca
City of Fredericton	NB		Roger Shannon		506-460-2020	shannonr@city.fredericton.nb.ca
City of Moncton	NB		Stephane Thibodeau		(506) 383-6718	stephane.thibodeau@moncton.org
City of Moncton- Codiak Transit Commission	NB		John Allain	506-859-2680	506-857-2008	john.allain@moncton.org
City of Moncton - CN Rail	NB		Will Myers	506-853-2234	506-853-2214	will.myers@cn.ca
City of St. John	NB		Eric Giffin, Municipal Senior Project officer		506-658-2896	eric.giffin@cityofsaintjohn.com
Coastal Transport	NB	PO Box 7235, Saint John NB E2L 4S6	Murray Ryder	506-642-0526	506-642-0523	mryder@nbnet.nb.ca
Comdev Wireless	NB	328 Urquhart Ave., Moncton NB E1H 2R6	Guy Beaulieu, Sales Manager	506-863-1524	506-857-1417	guy.beaulieu@wireless.comdev.ca
Dalhousie Port Authority	NB					
Day & Ross Inc	NB	398 Main St, Hartland E7P 1C6	Mike Likely, V.P of Information Systems	506-375-4945	506-375-4401	mblikely@dayandrossinc.ca
Dramis Network Cabling Ltd.	NB	PO Box 1162, 500 St. George Street Moncton NB E1C 8P9	Murray Simard	506-383-4916	506-383-4040	msimard@dramis.com
e-Hub.net	NB	331 Elmwood Drive, Suite 4-237, Moncton NB E1A 1X6	Marc Maurice	506-861-0997	506-388-4199	info@e-hub.net

Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
Environment and Local Government New Brunswick - Policy, Educational Services and Communications	NB	Marysville Place, PO Box 6000, 20 McGloin St, Fredericton E3B 5H1	Michael Merritt, Executive Director	506-453-3676	506-453-8762	mike.merritt@gnb.ca
Greater Moncton Airport Authority Inc	NB	1575 Champlain St, Unit 12, Dieppe E1A 7P5	Rob Robichaud, President & CEO	506-856-5461	506-856-5440	robir@nbnet.nb.ca
Ibridge Inc.	NB	480 Main Street, Woodstock NB E7M 2C1	Paul Dore, President	506-328-4602	506-328-4282	pdore@ibridge.net
Institute of Transportation Engineers - Atlantic Provinces Section	NB	c/o Geoplan Consultants Inc, 919 Prospect St, Fredericton E3B 2T7	Karen Robichaud, President	506-450-4838	506-451-0055	geoplan@geoplan.nb.ca
Intelisys Aviation Systems Inc.	NB	815 Bombardier Street, Shediac NB E4P 1H9	Ralph Eisenschmid, President	506-533-1470	506-532-8515	info@ameliasoftware.com
Investment and Exports New Brunswick - Planning and Research	NB	Centennial Bldg, PO Box 6000, King St, Fredericton E3B 5H1	Doug Holt, Director	506-444-5299	506-444-5373	doug.holt@gnb.ca
J.D. Irving	NB	300 Union Street, P.O. Box 5777, Saint John, NB E2L 4M3	Robert Youden, VP Irving Transportation Services	506-632-5150	506-633-5540	youden.bob@jdirving.com
LearnStream Inc.	NB	420 York St., 3rd Floor Chestnut Complex, Fredericton NB E3B 3P7	Phillip Lambert	506-447-4911	506-447-4900	info@learnstream.com
Nav Canada - Eastern Region - Atlantic	NB	222 Old Coach Road, Riverview E1B 4G2	Tony Mason, Regional Safety Manager	506-867-7081	506-867-7055	masondt@navcanada.ca
NB Southern Railway	NB	11 Gifford Rd, PO Box 5666, Saint John E2L 5B6	Dale Thibodeau, General Manager	506-632-5818	506-632-4712	thibodeau.dale@sunburytransport.com
New Brunswick Community College - Dieppe	NB	505 College Street, Dieppe, NB, E1A 6X2	Raymond Dufour, Instructor Business Technology Transportation	506-856-2125	506-856-2201	raymond.dufour@gnb.ca
New Brunswick Department of Public Safety	NB	P.O. Box 6000, Fredericton, N.B.	Bill Adams		506-453-5376	Bill.Adams@gnb.ca

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Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
New Brunswick Department of Public Safety	NB	P.O. Box 6000, Fredericton, N.B.	Eric Howatt, CVO Reg.		506-457-7822	Eric.Howatt@gnb.ca
New Brunswick Department of Public Safety	NB		Ron Richard			Ron.Richard@gnb.ca
New Brunswick Department of Public Safety	NB		John Goggin		506-453-2407	John.Goggin@gnb.ca
New Brunswick Department of Transportation - Policy	NB	670 King St, PO Box 6000, Fredericton E3B 5H1	Dave MacFarlane, Maintenance & Traffic		506-453-2600	Dave.Macfarlane@gnb.ca
New Brunswick Department of Transportation - Policy	NB	670 King St, PO Box 6000, Fredericton E3B 5H1	Don Mason, Maintenance & Traffic		506-453-2600	Don.Mason@gnb.ca
New Brunswick Department of Transportation - Policy	NB	670 King St, PO Box 6000, Fredericton E3B 5H1	Tyrone Parsons, Radio Communications		506-453-3393	Tyrone.parsons@gnb.ca
New Brunswick East Coast Railway	NB	34 Rail Road, Campbellton E3N 3G7	Francis Mimeault, General Manager	506-753-0462	506-753-0454	fmimeaul@cfqc.com
Royal Canadian Mounted Police	NB	NCO1C Traffic Services, PO Box 3900, E3B 4Z8	Staff Sergeant Robert Theriault	506-452-3312	506-452-3421	bob.theriault@rcmp-grc.gc.ca
Saint John Harbour Bridge Authority	NB	29 King St. W, PO Box 3728, Stn B, Saint John E2M 5C1	Jack Keir, General Manager	506-635-1322	506-635-1320	sjhb@nbnet.nb.ca
Saint John Parking Commission	NB	PO Box 1971, Saint John E3L 4L1	Richard Smith, Administrator	506-649-7938	506-658-2897	richard.smith@city.saint-john.nb.ca
Saint John Port Authority	NB	133 Prince William St, 5th Floor, Saint John E2L 2B5	Al Soppitt, President & CEO / Pat LeBlanc, Corporate Secretary	506-636-4443	506-636-4869	ags@sjport.com
Saint John Transit Commission	NB	PO Box 3860, Stn B, Saint John E2M 5C2	Frank McCarey, General Manager	506-658-4704	506-658-4710	sjtrans2@nbnet.nb.ca
SMT (Eastern) Limited - Head Office	NB	100 Midland Dr, Dieppe E1A 6X4	Don Carmichael, General Manager	506-859-5111	506-859-5100	carmichael.don@smtbus.com

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Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
Sunbury Transport Limited	NB	PO Box 905 Stn A, Fredericton E3B 5B4	Dale Thibodeau	506-458-2542	506-453-1133	thibodeau.dale@sunburytransport.com
The DPL Group	NB	1216 Sand Cove Road, Saint John NB E2M 5V8	Rick Baker, GM, Research & Development & Production	506-635-1057	506-635-1055	marketing@dpl.ca
Tourism Association of New Brunswick	NB	PO Box 23001 Fredericton, NB, E3B 7B3	Real Robichaud	506-459-3634	506-458-5646	realr@tianb.com
Transport Canada - Atlantic Region Coordination	NB	95 Foundry St, PO Box 42, Moncton E1C 8K6	Roger Saunders, Transportation Analyst	506-851-7576	506-851-7573	saunder@tc.gc.ca
Trip Data and Safety Management Inc.	NB	PO Box 29098, RPO North End, 383 Baig Blvd. Moncton NB E1G 4R3	Andy Brownell	506-853-7612	506-853-7522	tdsm@tdsm.com
University of New Brunswick - UNB Transportation Group	NB	Head Hall, Room D126, PO Box 4400, Fredericton E3B 5A3	Eric Hildebrand	506-447-3440	506-452-6229	edh@unb.ca
Ajilon Canada - DGS Information Technology	NF	47 New Gower Street St. John's Newfoundland A1C 1J4	P. Young	709-754-4240	709-722-1871	pyoung@dgsinfo.com
Aliant Inc. - NewTel Communications & Public Affairs	NF	PO Box 2110, St. John's A1C 5H6	Harry Connors, Vice President	709-739-3955	709-739-2837	harry.connors@aliant.ca
Beothuk Data Systems Ltd.	NF	17 Pippy Place, PO Box 8951, St. John's, Newfoundland A1B 3R9	R. Benson	709-753-3333	709-753-9061	rbenson@beothuk.com
Briggs Aero Ltd.	NF	Gander International Airport PO Box 574, Gander Newfoundland A1V 2E1	K. Smith	709-256-8271	709-256-8147	ksmith@briggsaero.com
Canadian Manufacturers & Exporters, Newfoundland Division	NF	1st Floor, Parson's Bldg, 90 O'Leary Avenue, St. John's, NF A1B 2C7	Tina Pomroy	709-772-3213	709-772-3337	tina.pomroy@cme-mec.ca
Canpolar East	NF	702 Water Street, St. John's NF A1E 1C1		709-722-1138	709-722-6067	info@canpolar.com

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Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
City of Corner Brook - Engineering Services Department	NF	PO Box 1080, Corner Brook A2H 6E3	James Warford, Coordinator	709-637-1502	709-637-1626	jwarford@citycornerbrook.nf.ca
City of St. John's - Engineering & Planning	NF	City Hall, 10 New Glower St, PO Box 908, St. John's A1C 5M2	Robin King, Transportation Engineer	709-576-8625	709-576-8658	rking@city.st-johns.nf.ca
ColabNet Collaborative Network Technologies	NF	55 Bond Street, Suite 202, St. John's Newfoundland A1C 5V3		709-754-7482	709-754-7406	info@colabnet.com
Consilient Technologies Corp.	NF	Suite 105, 66 Kenmound Rd., PO Box 2172, Stn C St. John's NF A1C 6E6			709-576-1706	info@consilient.net
Consolidated Technologies Ltd.	NF	37 Stavanger Drive, St. John's Newfoundland, A1A 5E8	Gary Dinn, President	709-576-0746	709-576-0748	mail@contechnav.com
Earth Information Technologies (NF) Limited	NF	20 Mercers Drive, St. John's NF A1A 2X1	Mr. Robert Leeman	709-576-2546	709-738-1638	geomatics@eitnf.com
Emergency Measures Organization - Department of Municipal & Provincial Affairs	NF	P.O. Box 8700, St. John's, NF A1B 4J6	Elizabeth Peckham, Director	709-729-3857	709-729-3703	niemo@mail.gov.nf.ca
Futureworks Inc.	NF	24 OceanView Hill, PO Box 1012, Torbay, NF A1K 1K9	K. McBride	709-772-2462	709-437-1877	kmcbride@fastfwd.com
Gander International Airport Authority Inc	NF	1000 James Blvd, Gander A1V 1W8	Gary Vey, President & CEO	709-256-8092	709-256-2750	QX.Airport@nf.sympatico.ca
Guigne Technologies Ltd.	NF	Box 13, Site 21, RR#1, 685 St. Thomas Line, Paradise NF A1L 1C1	Dr. Jacques Guigne	709-895-3999	709-895-3819	GIL@guigne.com
Hunt's Transport Ltd	NF	PO Box 81, Paradise A1L 1C4	Greer Hunt	709-747-5516	709-747-4868	hunts@firstcity.net
Instrumar Limited	NF	PO Box 13246 St. A, 39 Pippy Place, 3rd Floor, St. John's NF A1B 4A5	Michael Chan	709-726-8613	709-726-8460	michael.chan@instrumar.com

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Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
Memorial University - Faculty of Engineering & Applied Science - Ocean Engineering Research Centre	NF	St. John's A1C 5S7	Claude Daley, Director	709-737-2116	709-737-8805	cdaley@engr.mun.ca
Newfoundland & Labrador Department of Environment - Policy & Planning	NF	Confederation Building, PO Box 8700, Prince Philip Dr, St. John's A1B 4J6	John Drover, Director	709-729-6969	709-729-1090	jdrover@gov.nf.ca
Newfoundland & Labrador Department of Industry, Trade & Rural Development - Information Services	NF	Confederation Building, PO Box 8700, Prince Philip Dr, St. John's A1B 4J6	Tim Summers, Manager	709-729-4858	709-729-4819	tsummers@mail.gov.nf.ca
Newfoundland & Labrador Department of Tourism, Culture & Recreation - Tourism	NF	Confederation Building, PO Box 8700, Prince Philip Dr, St. John's A1B 4J6	Brenda Walsh, MC & IT Specialist	709-729-0057	709-729-2777	bbwalsh@mail.gov.nf.ca
Newfoundland & Labrador Department of Works, Services & Transportation - Goose Bay Region	NF	PO Box 3014 Stn B, Happy Valley-Goose Bay A0P 1E0	Dean Osmond, Regional Director	709-896-513	709-896-7840	osmondjd@mail.gov.nf.ca
Newfoundland & Labrador Department of Works, Services & Transportation - Policy & Planning	NF	Confederation Building, PO Box 8700, Prince Philip Dr, St. John's A1B 4J6	Wanda Lundrigan, Director of Policy and Planning	709-729-0283	709-729-5344	lundriganw@mail.gov.nf.ca
Newfoundland & Labrador Department of Works, Services & Transportation - Policy & Planning	NF		Tom Beckett, Deputy Registrar Motor Vehicles	709-729-6955	709-729-2520	beckettt@mail.gov.nf.ca
Newfoundland & Labrador Department of Works, Services & Transportation - Policy & Planning	NF		Keith White- Executive Director Roads	709-729-0283	709-729-5399	whitek@gov.nf.ca

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Newfoundland & Labrador Department of Works, Services & Transportation - Policy & Planning	NF		Cluney Mercer - Director of Construction	709-729-0283	709-729-6321	mercercg@gov.nf.ca
Newfoundland & Labrador Department of Works, Services & Transportation - Policy & Planning	NF	Confederation Building, 6th Floor, West Block, P.O. Box 8700, St. John's, Newfoundland A1B 4J6	Neil Campbell - Director of Maintenance	709-729-6934	709-729-3636	campbelln@mail.gov.nf.ca
NF Carriers Association	NF		Gerry Dowden			
NF & Lab. Independent Truckers	NF		Jon Summers			
Northstar Technical Inc.	NF	687 Water Street, PO Box 37052, St. John's NF A1E 1C2		709-738-6443	709-738-6440	info@northstar-technical.com
Pathix ASP Inc.	NF	34 Harvey Road, St. John's NF, A1C 5P3	Mr. Paul Dube, VP Corp. Development	709-724-8545	709-724-8500/ 1-866-724-8500	inquiries@pathix.com
Provincial Airlines	NF	Torbay Airport, PO Box 9460, St. John's A1A 2Y4	Roy Symonds, Service Manager	709-726-0105	709-726-3712	
Puddister Trading Ltd	NF	23 Springdale St, St. John's A1C 5H5	Gerry Puddister, Owner	709-722-8008	709-722-4000	puddister.ncl@nf.sympatico.ca
St. John's International Airport	NF	80 Terminal Access Rd, PO Box 301, St. John's A1A 3R1	Jim Roche, General Manager	709-758-8521	709-758-8500	jroche@stjohns-airport.nf.ca
St. John's Port Authority	NF	1 Water St, PO Box 6178, St. John's A1C 5X8	Sean Hanrahan, President & CEO	709-738-4748	709-738-4782	shanrahan@sjpa.com
St. John's Regional Fire Department	NF	PO Box 908, C72, St. John's A1C 5M2	Jack Hickey, Deputy Chief	709-576-8635	709-576-8644	ghickey@city.st-johns.nf.ca
St. John's Transportation Commission - Metrobus	NF	245 Freshwater Rd, St. John's A1B 1B3	Janet Bradshaw, General Manager	709-722-0018	709-570-2063	janetb@metrobus.com
Stratos Mobile Networks	NF	34 Glencoe Drive, St. John's NF A1N 4S8		709-748-4305	709-748-4233	info@stratos.ca
Acadian Line Limited	NS	6040 Amon Street, Halifax, Nova Scotia, B3K 1T8	Brian Hacket			

Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
Air Canada Regional	NS	310 Goudey Drive, Halifax International Airport Enfield, Nova Scotia, B2T 1E4	Joseph Randell, President & CEO			
Air Nova - Marketing	NS	Halifax International Airport, 310 Goudey Dr, Enfield B2T 1E4	Rick Flynn, Vice President	902-873-2098	902-873-4911	RicFlynn@airnova.ca
Atlantic Container Line AB	NS	1969 Upper Water St, Suite 1608, Halifax, Nova Scotia, B3J 3R7	Fritz King		902-420-9259	
Atlantic Television System (ATV) Atlantic Satellite Network (ASN)	NS	2885 Robie St, PO Box 1653, Halifax B3J 2Z4	Ron MacNeil, IT Manager	902-453-4000	902-454-3302	rmacneil@ctv.ca
Autoport Limited	NS	PO Box 9, Eastern Passage, Halifax County, Nova Scotia, BOJ 1L0	Des Gomes			
Cabco Communications Group	NS	4 MacDonald Ave., Dartmouth, NS B3B 1C5	Don Reid, Data Proj. Mgr.	902-468-2557	902-468-2252/ 902-383-4574/ 1-800-675-4025	dreid@cabco.ca
Canada Customs and Revenue Agency	NS	5th Floor CIBC Building, 1809 Barrington Street, Halifax, NS, B3J 3K8	Dan Coffin, Director, Customs Atlantic Region	902-426-5042	902-426-2914	dan.coffin@ccra-adrc.ca
Canada Customs and Revenue Agency	NS	1809 Barrington St., CIBC Building 5th Floor, Halifax B3J 3K8	Anna LeBlanc	902-426-5527	902-426-1824	Anna.LeBlanc@ccra-adrc.gc.ca
Canada Customs and Revenue Agency - Marine Operations and Commercial Client Customs Services	NS	PO Box 3080, Halifax B3J 3G6	Sue Horne, Client Services Officer	902-426-8825	902-426-7340	sue.horne@ccra-adrc.gc.ca
Cape Breton & Central Nova Scotia Railway	NS	121 King St, Stellerton B0K 1S0	Peter Touesnard, Business Development Manager	902-752-6665	902-752-3357	ptouesnard@railamerica.com
CN Rail	NS	3833 Barrington Street, P.O. Box 8296 Station A, Halifax, NS, B3K 5M1	Shawn McMahon, Manager CN Intermodal	902-428-5218	902-428-5270	
Core Networks	NS	55 Chain Lake Drive, Suite 19, Halifax, NS B3S 1B3		902-481-5799	902-468-6397/ 1-866-855-2673	info@corenetworks.com

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Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
Council of Atlantic Premiers	NS	Royal Bank Building, 5161 George St, PO Box 2044, Halifax B3J 2Z1	Glenn Davis	902-424-8976	902-424-7600	gdavis@cmp.ca
Diaphonics	NS	3045 Robie Street, Suite 6, Halifax, NS B3K 4P6	Jeremy Bernard	902-484-3542	902-452-1187	Jeremyb@diaphonics.com
Eastern Canada Towing	NS	PO Box 337, Halifax, Nova Scotia, B3J 2N7	Paul Ritcey, President	902-423-5123	902-423-7381	ritcey@ectug.com
Emergency Measures Organization - Nova Scotia Headquarters	NS	PO Box 2581, Halifax B3J 1N5	Mike Myette, Deputy Director / 911 Manager	902-424-5376	902-424-6206	myettemj@gov.ns.ca
Environment Canada - Corporate Planning	NS	Queen Square, 45 Alderney Dr, Dartmouth B2Y 2N6	Zal Davar, Policy and Planning Advisor	902-426-2690	902-426-2284	zal.davar@ec.gc.ca
Fairview Cove Container Terminal Cerescorp Inc.	NS	PO Box 8958, Station A, Halifax, Nova Scotia, B3J 2X7	Calvin Whidden			
Fisheries and Oceans Canada - Canadian Coast Guard - Maritimes Region	NS	176 Portland St, PO Box 1035, Dartmouth B2Y 4T3	Gary Walsh, Regional CG Planning Officer	902-426-4312	902-426-4370	walshga@mar.dfo-mpo.gc.ca
Freight 2000	NS	PO Box 789, Elmsdale B0N 1M0	George Hill	902-758-1543	902-758-2910	freight2@1star.ca
Halifax International Airport Authority	NS	1 Bell Boul, 3rd Floor, PO Box 40, Enfield B2T 1K2	Rick Garcon	902-873-4750	902-873-4422	milleyr@hiaa.ca and brownl@hiaa.ca (send to both)
Halifax Port Authority	NS	1215 Marginal Rd, PO Box 336, Halifax B3J 2P6	Jim Nicoll	902-426-7335	902-426-3643	dbelle@portofhalifax.ca
Halifax Regional Municipality - Halifax Regional Police Service	NS	1975 Gottingen St, Halifax B3J 2H1	David McKinnon, Chief	902-490-5038	902-490-6500	mckinnd@region.halifax.ns.ca
Halifax Regional Municipality - Metro Transit	NS	200 Ilsey Ave, Dartmouth B3B 1V1	Brian Taylor, Director	902-490-6688	902-490-6608	taylorb@region.halifax.ns.ca
Halifax Regional Municipality - Traffic and Transportation	NS	PO Box 1749, Halifax B3J 3A5	David Mc Cusker, Manager	902-490-6904	902-490-6696	mccuskd@region.halifax.ns.ca
Halifax Shipping Association	NS	c/o Cerr Norton Marine, Suite 610, 5670 Spring Garden Road, Halifax, NS, B3J 2H7	Russell Herder, Chairman	902-420-1450	902-422-8178	
Halifax-Dartmouth Bridge Commission	NS	Administration Building, Wyse Rd, PO Box 40, Dartmouth B2Y 3Y2	Steve Snider, General Manager	902-469-6281	902-463-2800	bridges@hdbc.ns.ca

Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
Halterm Limited	NS	PO Box 1057, Main Post Office, Halifax, Nova Scotia, B3J 2X1	Patrick Morin, President		902-421-1778	
Hapag-Lloyd (Canada) Inc.	NS	PO Box 9140, Halifax, Nova Scotia, B3K 5M7	Peter Selig, General Manager	902-453-4881	902-453-4747	usa.seligp@hlci.com
Highway 104 Western Alignment Corporation	NS	1969 Upper Water St, Suite 1305, Halifax B3J 3R7	Don Piercy, General Manager	902-422-6401	902-422-6718	dpiercy@highway104.ns.ca
IMP Group International	NS	2651 Dutch Village Road, Halifax, NS B3L 4T1		902-453-6931	902-453-2400	webmaster@impgroup.com
Maersk Canada Inc.	NS	PO Box 27064 Green St. Halifax, N.S. B3J 1N0	Allan Ray		902-422-7331 ex. 227	
Marine Atlantic Inc - Marine Services	NS	355 Purves St, North Sydney B2A 3V2	John Lochhead, Director	902-794-5283	902-794-5744	jlochhead@marine-atlantic.ca
Medusa Medical Technologies Inc	NS	Suite 701, 1888 Brunswick St, Halifax, NS B3J 3J8	Christopher D McNamara	902-484-5583	902-429-5916	cmcnamara@medusamedical.com
Metocean	NS	21 Thornhill Drive, Dartmouth NS B3B 1R9		902-468-4442	902-468-2505	webmfr@meteocean.com
N.S. Road Builders Association	NS	109 Chain Lake Drive, Halifax, Nova Scotia, B3S 1B3	Ron Legere			
N.S. Truckers Association	NS	PO Box 1527, Truro, Nova Scotia B2N 5Z2	Dave Roberts	902-897-0487	902-895-7447	dave@tans.ca
Nova Scotia CAD/CAM Centre	NS	Technical University of Nova Scotia PO Box 1000, Halifax, NS B3J 2X4	Leigh Day	902-422-8380	902-494-6040	leigh@tuns.ca
Nova Scotia Department of Economic Development - Port Development	NS	World Trade Centre, 1800 Argyle St, PO Box 519, Halifax B3J 2R7	Wade Elliott, Consultant	902-424-5739	902-424-7051	elliottw@gov.ns.ca
Nova Scotia Department of Health - Emergency Health Services - Communications Dispatch Services	NS	Bedford Tower, Suite 401, 1496 Bedford Highway, Halifax B4A 1E5	Grant Lingley, Director	902-424-1781	902-424-2679	lingleyg@gov.ns.ca
Nova Scotia Department of Tourism & Culture - Policy	NS	World Trade Centre, 1800 Argyle St, Halifax B3J 2R5	David Ross, Director	902-424-4872	902-424-0424	dross@gov.ns.ca

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Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
Nova Scotia Department of Transportation & Public Works - Asset Management	NS	Purdy's Wharf Tower II, 1969 Upper Water St, PO Box 186, Halifax B3J 2N2	Janice Harland, Road Network Management	902-424-0571	902-424-4206	harlanja@gov.ns.ca
Nova Scotia Transportation Strategy Working Group	NS	984 Bellevue Avenue	John Gratwick	902-422-6215	902-423-1606	
OKAM Logic Inc	NS	1161 Hollis Street, Suite 360 Halifax, NS B3H 2P6		902-466-6889	902-492-8496	
Public Works and Government Services Canada - Atlantic Region Real Estate Division	NS	1713 Bedford Row, PO Box 2247, Halifax B3J 3C9	David Alexander, Land Surveyor	902-496-5276	902-496-5252	david.alexander@pwgsc.gc.ca
Satlantic	NS	Richmond Terminal Pier 9, 3481 North Marginal Road Halifax, NS B3K 5X8		902-492-4781	902-492-4780	info@satlantic.com
Secunda Marine	NS	PO Box 605, Halifax, Nova Scotia, B3J 2X1	Mr. Fred Smithers			
Seimac Limited	NS	271 Brownlow Ave., Dartmouth NS B3B 1W6	Mac MacCleod	902-468-3009	902-468-3007	mmacleod@seimac.com
Semaphore Solutions Inc	NS	3 Forest Drive, Halifax, NS B3N 1M8	Randy Rolls		902-830-5630	rrolls@semaphoresupport.com
Service Nova Scotia & Municipal Relations - Compliance	NS	Purdy's Wharf Tower II, 1969 Upper Water St, PO Box 186, Halifax B3J 2N2	Paul Arsenault, Director	902-424-0523	902-424-7801	arsenapj@gov.ns.ca
SPM Marine International Inc.	NS	PO Box 31 CRO Halifax, Nova Scotia, B3J 2L4	Roger Swallow	902-425-7054	902-425-7945	roger@spmgroup.com
Strait of Canso Superport Corporation	NS	PO Box 238 Mulgrave, Nova Scotia BOE 2G0	John Langley	902-747-2453	902-747-2078	straitsuperport2@ns.sympatico.ca
Sydney Airport Authority	NS	PO Box 670, Sydney, Nova Scotia B1P 6H7	Vince MacLean, Chairman			
Transport 2000	NS	40 Lorne Avenue, Dartmouth, Nova Scotia, B2Y 3E7	John Pearce, President		902-468-2306	
Transport 2000 Atlantic	NS	37 1/2 Fairbanks Street, Dartmouth, NS, B3A 1B9	Marcus Garnet, Vice President	902-490-4346	902-490-4481	garnetm@region.halifax.ns.ca

Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
Transportation Safety Board	NS	150 Thorn Ave., Dartmouth NS B3B 1Z2	Don Ross	902-426-5143	902-426-1680	Ross@tsb.gc.ca
VIA Rail (Halifax Office)	NS	1161 Hollis Street, Halifax, NS, B3H 2P6	Dave DeWolfe	902-494-7925	902-494-7900	
Voluntary Planning - Transportation Sector	NS	Suite 600, Joseph Howe Building, 1690 Hollis Street, Halifax, NS, B3J 3J9	Rita Fraser, Sector Coordinator	902-424-0580	902-424-5682	fraserra@gov.ns.ca
Windsor & Hantsport Railway Company	NS	PO Box 578, Windsor B0N 2T0	James Taylor, General Manager	902-798-0816	902-798-0798	jimwhrc@ns.sympatico.ca
Yarmouth Airport Commission	NS	PO Box 266, Yarmouth, Nova Scotia, B5A 4B2	Fraiser Howel	902-742-6881	902-742-6484	
Zim Container Service	NS	PO Box 227, Halifax Nova Scotia B3J 2N7	Jim Stoneman			
Air Transport Association of Canada	ON	255 Albert St, Suite 1100, Ottawa K1P 6A9	Cliff Mackay, President	613-230-8648	613-233-7727 ext. 313	cmackay@atac.ca
Atlantic Canada Opportunities Agency (ACOA - APECA) - Ottawa Office	ON	PO Box 1667, Station B, Ottawa K1P 5R5	Michael Zinck, Policy Officer	613-954-0429	613-952-9106	mzinck@acoa-apeca.gc.ca
Bank of Nova Scotia - Electronic Banking - Merchant Products and Smart Card Program	ON	44 King St W, Toronto M5H 1H1	Bryce Hutt, Senior Manager	416-866-7085	416-866-4902	
Canada 3000 Airlines	ON	27 Fashen Drive, Toronto Ontario, M9W 1K6	Angus Kinnear, President			
Canadian Automobile Association - Communications	ON	1145 Hunt Club Road, Suite 200, Ottawa K1V 0Y3	Elly Meister, Vice President	613-247-0118	613-247-0117	emeister@national.caa.ca
Canadian Courier Association	ON	555 Dixon Road, Etobicoke M9W 1H8	Phil Cahley, Executive Director	416-242-2570	416-242-9874	pcahley@canadiancourier.org
Canadian Trucking Alliance (CTA) - Public Affairs & Research	ON	130 Slater St, Suite 1025, Ottawa K1P 6E2	Richard Cavanagh, Director	613-563-2701	613-236-9426	cavanagh@istar.ca

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Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
Canadian Urban Transit Association - Research and Technical Services	ON	55 York St, Suite 901, Toronto M5J 1R7	Brendon Hemily, Manager	416-365-1295	416-365-9800	transit@cutaactu.on.ca
Cancom Tracking Solutions - Marketing Communications	ON	50 Burnhamthorpe Rd West, Mississauga N5P 2P5	Krista Hutchins-Deering, Manager	905-272-3399	905-272-6621	kdeering@cancom.ca
Communications Research Centre (CRC) - Terrestrial Wireless Systems	ON	3701 Carling Ave, PO Box 11490, Ottawa K2H 8S2	Gerry Chan, Vice President	613-990-4715	613-998-4139	gerry.chan@crc.ca
Fortran Traffic Systems Limited	ON	470 Midwest Road, Toronto M1P 4Y5	Peter Lengyel, CEO	416-288-1939	416-288-1320 ext. 207	plengyel@fortrantraffic.com
ITS Canada - c/o Delcan Corporation	ON	133 Wynford Drive, North York M3C 1K1	Joseph Lam, Chairman	416-441-0226	416-391-7521	toronto@delcan.com
Motor Coach Canada	ON	4141 Yonge St, Suite 306, Toronto M2P 2A8	Brian Crow, President	416-229-6281	416-229-9305	
Private Motor Truck Council of Canada (PMTC)	ON	1155 North Service Road West, Suite 11, Oakville L6M 3E3	Bruce Richards, President	905-927-8212	905-827-0587	trucks@pmtc.ca
RCMP - Chief Information Office	ON	1200 Vanier Parkway C400, Ottawa K1A 0R2	Gavin Berube, Information Architect	613-993-7824	613-993-7061	gavin.berube@rcmp-jrc.gc.ca
Transport Canada - Intelligent Transportation Systems	ON	Tower C, Place de Ville, 330 Sparks Street, Ottawa K1A 0N5	Helena Borges, Senior Policy Coordinator	613-998-2686	613-998-9834	borgesh@tc.gc.ca
Transport Canada - Transportation of Dangerous Goods	ON	Place de Ville, 330 Sparks St, 9th floor, Ottawa K1A 0N5	Gerry McPhee, Senior Technical Officer	613-990-5925	613-990-1138	mcphee@tc.gc.ca
University of Toronto - Department of Civil Engineering - ITS Centre	ON	35 George St, Toronto M5S 1A4	Baher Abdulhai, Professor	416-978-5054	416-946-7662	baher@ecf.utoronto.ca
3M Canada Company - Intelligent Transportation Systems	ON	PO Box 5757, London N64 4T1	Bill Woolford, Project Manager	519-452-6245	519-452-6269	bhwoolford@mmm.com

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Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
National Research Council of Canada - Industrial and Government Relations - Institute for Microstructural Science	ON	1200 Montreal Road, Bldg M50, Ottawa K1A 0R6	Winston Tam, Advisor	613-957-8734	613-990-7656	winston.tam@nrc.ca
Navigation Technologies Canada	ON	550 Alden Road, Suite 201, Markham L3R 6A8	Michael Bailey, General Manager	905-305-7482	905-305-6652	mbailey@navtech.com
Transportation Association of Canada - Research and Information Services	ON	2323 St. Laurent Blvd, Ottawa K1G 4J8	John Pearson, Technical Program Director	613-736-1395	613-736-1350	jpearson@tac-atc.ca
Atlantic Canada Airports Association	PE	273 Richmond Street, Charlottetown, PE, CIA 1J7	Gerry Gallant, Executive Director	902-628-1673	902-566-1701	ggallant@airports.ca
AcA Digital Knowledge	PE	Box 55 Wellington Station PEI C0B 2E0	Angie Cormier	902-854-2741	902-854-3487	acprmier@teleco.org
Baseline Business Geographics	PE	PO Box 123, 209 Queen St., suite 205, Charlottetown PEI C1A 7K2	Frank MacEachern, President	902-628-0300	877-351-2244/ 902-892-0300	frankm@baselinegeo.com
Bulk Carriers (PEI) Ltd.	PE	P.O. Box 153, New Haven, PE, C0A 1H0	Jack Kelly	902-675-3100	(902) 675-2600	bulkcarriers@attcanada.ca
Caltech Information Technologies	PE	PO Box 695, Charlottetown PEI C1A 7L3	Nazmi Lawen	902-566-3768	902-368-2320	
Charlottetown Airport Authority Inc	PE	250 Maple Hills Ave, Suite 132, Charlottetown C1C 1N2	Michael Campbell, General Manager	902-566-7929	902-566-7997	info@charlottetownairport.pe.ca
CIFTA Technologies	PE	Box 104 Wellington, PEI C0B 2E0	Shawn Gallant	902-854-3011	902-854-7278	shawn@cifta.com
City Cab Taxi	PE	168 Prince St, Charlottetown	Joseph Corrigan, Proprietor	902-892-6568	902-892-6567	
City of Charlottetown - Corporate Affairs	PE	199 Queen St, PO Box 98, Charlottetown C1A 7K2	Donna Waddel, Director	902-566-4701	902-566-5548	dwaddel@city.charlottetown.pe.ca
City of Summerside	PE	1 West Drive, PO Box 1510, Summerside C1N 4k4	Cynthia Wedge	902-432-3191	902-432-1256	cwedge@city.summerside.pe.ca
City of Summerside Technical Services	PE	45 Summer St. P.O. Box 1510 C1N 4K4	Cindy Wedge		902-566-1224	cwedge@city.summerside.pe.ca
Coles Associates Ltd	PE	197 Malpeque Road, PO Box 695, Charlottetown C1A 7L3	Richard Coles, President	902-566-3768	902-368-2300	rcoles@caltech.ca

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Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
DeltaWare Systems Inc.	PE	535 North River Road, Charlottetown PE C1E 1J6	Ed Lawlor	902-628-4660	902-368-8122	elawlor@deltaware.com
Emergency Measures Organization - PEI	PE	P.O. Box 2000, Charlottetown, PE, C1A 7N8	Jack Saunders, Director	902-368-5582	902-368-5526	
Freedom Tech Inc.	PE	PO Box 1896 Charlottetown PEI C1A 7N9	William McMaster		902-629-5908	wbm@formbydesign.com
GE Capital IT Solutions Inc.	PE		Jeff Vey	902-481-8119	902-471-3248	jvey@gects.ge.com
GeoNet Technologies Inc.	PE	Box 3989, Central Bedeque, PEI C0B 1G0	Mike Pearson	902-887-2349	902-887-3170	mike.pearson@geonet-tech.com
Holland College	PE	140 Weymouth St, Charlottetown C1A 5Z1	Alton Glenn, Professor	902-566-9509	902-566-9546	aglenn@hollandc.pe.ca
Information Technologies Association of Prince Edward Island	PE	PO Box 241, Charlottetown, PEI, C1A 7K4	Mike Ives, President	902-894-4867	902-894-4827	itap@itap.pe.ca
iWave.com	PE	PO Box 143, Charlottetown PEI C1A 7K2	Richard Jamieson	902-894-2630	902-894-2600	richard.jamieson@iwave.com
Northumberland Ferries Ltd	PE	94 Water St, PO Box 634, Charlottetown C1A 7L3	Mitchell McLean, Owner-Operator	902-566-1550	902-566-3838	
PEI Truckers Association	PE	3 Queen Street PO Box 3253 Charlottetown, PEI C1A 8W5	Sterling Crane, President	902-894-4943	902-894-4943	
Prince Edward Air	PE	250 Brackley Point Road, PO Box 2349, Charlottetown, PEI C1A 8C1	Bob Bateman, President	902-368-3573	902-566-4488	
Prince Edward Island Department of Agriculture and Forestry - Market and Industry Development Division	PE	Building 19, PO Box 2000, Charlottetown C1A 7N8	Tony Glencross, Technology Development Officer	902-569-7745	902-368-5641	taglencross@gov.pe.ca
Prince Edward Island Department of Development and Technology - Special Projects	PE	Shaw Building, 105 Rochford St, PO Box 2000, Charlottetown C1A 7N8	Kim Jay, Director	902-368-4224	902-368-6258	mkjay@gov.pe.ca
Prince Edward Island Department of Tourism - Policy, Planning & Research	PE	Shaw Building, 105 Rochford St, PO Box 2000, Charlottetown C1A 7N8	Chris Jones, Director	902-368-5922	902-368-6342	ckjones@gov.pe.ca

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Name (Agency or Firm)	Prov	Address	Contact Name	Fax	Phone	Email
Prince Edward Island Department of Transportation and Public Works - Planning, Development & Building Construction	PE	Jones Building, 11 Kent St, PO Box 2000, Charlottetown C1A 7N8	Paul Godfrey	902-368-5395	902-368-5155	jpgodrey@gov.pe.ca
Prince Edward Island Department of Transportation and Public Works - Planning, Development & Building Construction	PE	Jones Building, 11 Kent St, PO Box 2000, Charlottetown C1A 7N8	Cathy Worth, Project Engineer	902-368-5395	902-894-0276	ceworth@gov.pe.ca
Queen Elizabeth Hospital - Administration Office	PE	PO Box 6600, Charlottetown C1A 8T5	Marilyn Olson, Administrative Assistant	902-894-2416	902-894-2355	
Strait Crossing Bridge Limited	PE	104 Abegweit Boul, PO Box 2032, Borden-Carleton C0B 1X0	John Francis, General Manager	902-437-7321	902-437-7304	johnf@scbl.net
Technomedia Inc.	PE	17 Pownal Street, Charlottetown PEI C1A 3V7	Allan MacLeod	902-566-5447	902-368-3043	info@technomediapei.com
Trius Tours Ltd.	PE	PO Box 2288, Charlottetown, PEI C1A 8C1	George Brookins	902-566-3497	902-566-5664 or 902-566-9962	
University of Prince Edward Island, Engineering Department	PE	550 University Avenue, Charlottetown, PEI C1A 4P3	Professor Don Gillis, Engineering Department		902-566-0342	gillis@upei.ca
Veterans Affairs Canada - Knowledge Economy Partnership	PE	161 Grafton St, PO Box 7700, Charlottetown C1A 8M9	Marlene Zalewski, Senior Planning Advisor	902-368-0437	902-566-8888	mazalews@vs.vac-acc.gc.ca
Wireless Island	PE	105 Watts Ave., West Royalty Industrial Park, Charlottetown PEI C1E 2B7	Christopher Ogg	902-892-2671	902-628-2009	wisland@isn.net
Zambera Systems Inc.	PE	179 Queen Street, Charlottetown PEI C1A 4B4	Barb Allen	902-894-3534	902-894-3679/ 1-866-633-4725	barb@zambera.com
Canadian National Railway Co. - Market Planning	QC	935 rue de la Gauchetiere Ouest, Montreal H3B 2M9	Sandra Turgay, Director	514-399-7707	514-399-5958	turgay@cn.ca

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Inro Consultants Inc	QC	5160 Decarie Blvd, Suite 610, Montreal H3X 2H9	Michael Florian, President	514-369-2026	514-369-2023	mike@inro.ca
Railway Association of Canada	QC	800 boul Rene-Levesque ouest, Suite 1105, Montreal H3B 1X9	Robert Ballantyne, President	514-879-1522	514-879-8556	robertb@railcan.ca
Transportation Development Centre - Technology Applications Division	QC	800 boul Rene-Levesque ouest, 6th floor, Montreal H3B 1X9	Brian Marshall, Chief	514-283-7158	514-283-0009	marshab@tc.gc.ca
Calais-St Stephen Area International Border Crossing Public Advisory Committee - Maine Department of Transportation	US	16 State House Station, Augusta, ME 04333-0016	Kevin Rousseau, Transportation Planning Specialist	207-287-3292	207-287-2841	kevin.rousseau@state.me.us
Eastern Border Transportation Coalition	US	P.O. Box 243, Youngtown, New York, 14174	Irvine Rubin	716-745-1088	716-745-1087	
I 95 Corridor Coalition	US	77 Belmont Dr, Saratoga Springs, NY 12866	John Baniak, Executive Director	518-584-4827	518-584-4826	jbaniak@ny.cap.rr.com
I 95 Corridor Coalition - Massachusetts Highway Department	US	10 Park Plaza, Room 7111, Boston, MA 02116	Noreen Hazelton, Contract Manager	617-973-8487	617-973-8487	I95nhaze@aol.com
Intelligent Transportation Systems America	US	400 Virginia Ave SW, Suite 800, Washington, DC 20024-2730	Joseph Giglio, Vice Chair	202-484-3483	202-484-4847	webmaster@itsaorg
Prince of Fundy Cruises Limited	US	P.O. Box 4216, Portland, ME, 04101		207-773-7403	1-800-341-7540	
State of Maine	US					
US Department of Transportation - Federal Highway Administration - ITS Joint Program Office	US	Room 3401, HOIT-1, 400 7th St, SW, Washington, DC 20590	Christine Johnson, Director	202-366-3302	202-366-0408	christine.johnson@fhwa.dot.gov
US Department of Transportation - Federal Highway Administration - ITS Joint Program Office	US	Room 3401, HOIT-1, 400 7th St, SW, Washington, DC 20590	Jeff Piniati, ITS Joint Program Officer	202-366-3302	202-366-9536	jeff.piniati@fhwa.dot.gov

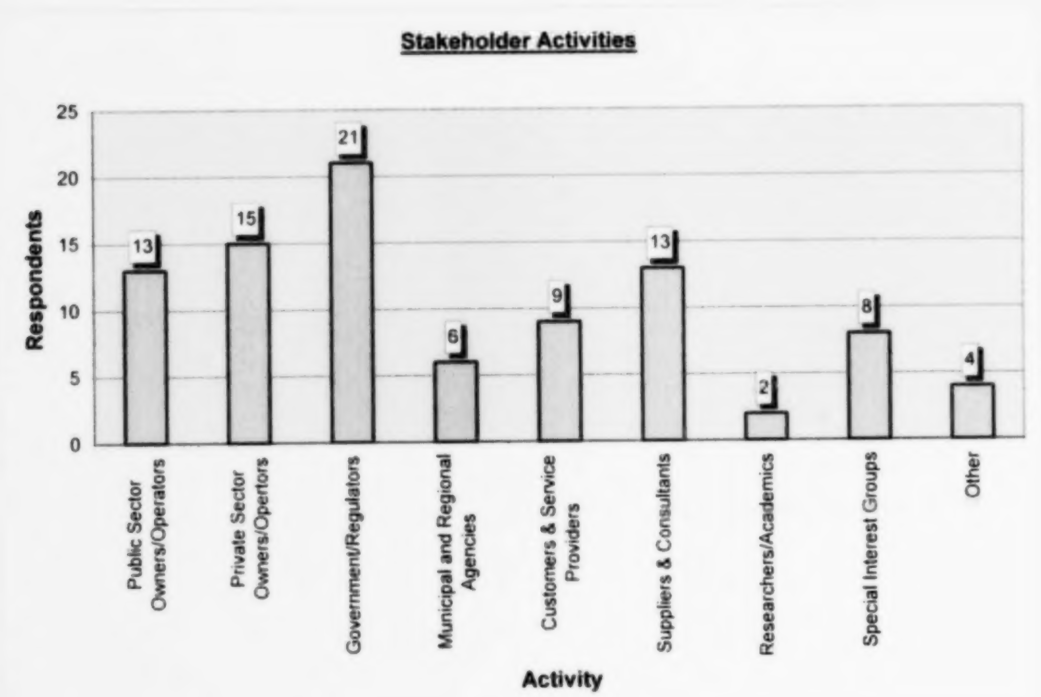
APPENDIX B

Web Survey Results

1. QUESTIONS FOR ALL STAKEHOLDERS

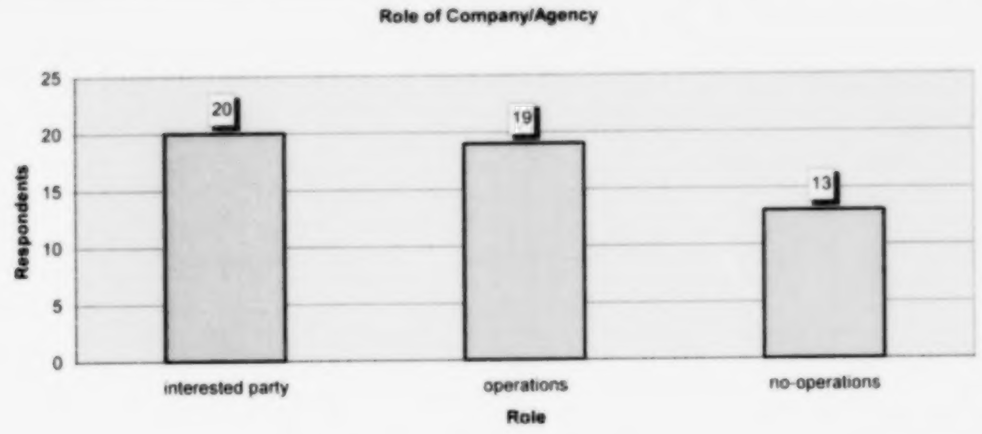
1.1 WHAT ACTIVITIES APPLY TO YOUR COMPANY/AGENCY (MORE THAN ONE MAY BE APPLICABLE)?

All stakeholders were asked to identify their areas of activity according to the categories shown in the chart below. A total of sixty responses were received, from a distribution list of 200. Note that any given stakeholder could identify multiple areas of activity, which yielded a total of 91 category responses, distributed as shown in the chart below.



1.2 WHAT COMMENT BEST DESCRIBES YOUR COMPANY/AGENCY/INVOLVEMENT IN ITS?

Each respondent was asked to indicate whether their involvement with Intelligent Transportation Systems would be characterized as an interested party, potential for direct involvement in an operations capacity, or potential for direct involvement without operations activity. As the chart indicates below, the responses were relatively evenly distributed; 8 of the 60 respondents did not offer a reply.



1.3 PLEASE DESCRIBE YOUR COMPANY'S/AGENCY'S PRIMARY MANDATE USING THE BOXES BELOW.

Each respondent was asked to characterize their primary mandate within the transportation industry. The following lists the responses received, illustrating the broad range of stakeholder roles. Typically the public sector respondents indicated their mission statements, with infrastructure owner/operators reflecting a customer service focus, and the mandate to manage transportation infrastructure. Private sector suppliers responses indicate product development and marketing mandates.

The following provides a complete listing of responses:

- Business Development in The Knowledge and Innovation Sector.
- Toll bridge facility that currently uses electronic toll system. (Amtech).
- Canadian Manufacturers and Exporters Newfoundland and Labrador Division (CME) are dedicated to promoting and preserving the interests of provincial manufacturers and exporters.
- Providing transportation consultation based on a vast experience working in a provincial transportation department for people, agencies or other organizations.
- Engineering Consulting Services.
- LearnStream is a custom courseware design firm creating effective learning experiences through inspired teaching techniques and the innovative use of technology.
- Diaphonics develops intuitive, user-friendly voice-interactive applications. diaphonics&#8217: PowerTalk Platform helps companies automate and improve the way they interact with their customers, suppliers and employees over the telephone. PowerTalk delivers automated speech

recognition and biometric security to the enterprise market, resulting in demonstrable cost savings and improved customer service.

- The objective behind the formation of the Saint John Parking Commission is to provide parking for the City of Saint John and the patrons using the parking services in Saint John.
- EMO (NS) administers and manages a Province wide enhanced 911 emergency reporting service.
- The Bridge Commission was created in 1950 by a statute of the province of Nova Scotia. With the approval of the Governor in Council, the Commission has the power to construct, maintain and operate bridges and the necessary approaches across the Halifax Harbour and the North West Arm, or either of them. The Commission currently provides safe and efficient crossing to the following modes of transportation.
- Collection and data processing of traffic count, classification and weigh-in motion data for all of Nova Scotia.
- To construct, maintain, and manage provincial highways, buildings and infrastructure; to provide accommodation and property services in support of sustainable economic growth and social well-being.
- To provide public transit to the City of St. John's, NF.
- Provide and Maintain a Safe Provincial Transportation System.
- Geomatics and GIS consulting.
- Ensure all levels of government are prepared to respond to emergencies as defined in the Emergency Measures Act and to coordinate provincial government emergency operations.
- To provide and maintain a safe and efficient transportation system in all matters within provincial jurisdiction and to monitor and advise on all matters of federal jurisdiction.
- To provide a safe and efficient transportation system for the province of New Brunswick.
- Transportation engineering consultancy.
- Manage municipal transportation network.
- Development of technology related ideas with the potential to benefit PEI Agriculture.
- For hire transport.
- Education in Transportation and Logistics.
- Develop, sell and implement computerized solutions for the airline and aviation sector.
- Socio-economic development on PEI.

- To provide a safe, efficient, and sustainable transportation system.
- High speed low cost open access community networking.
- Encouraging the economic development of the province.
- Provides mapping and GIS support for all modes (land, sea, air).
- Enhance public safety on provincial highways and reduce highway damage caused by overweight vehicles.
- Support for collaborative initiatives between the Atlantic provincial governments that will provide benefit to the region as a whole. To undertake projects which might not be possible or advisable by individual governments.
- To help promote the unique Acadian culture through tourism products.
- Industry Association Representing Manufacturers and Exporters.
- To ensure public safety on NB highways. Enforcing acts and regulations pertaining to Commercial Vehicles.
- To be the airport hub of Atlantic Canada. Offering air service to: all parts of Atlantic Canada; transborder connections to major US hubs; International services to major European hubs Offering cargo and passenger service whereas; cargo can be transferred efficiently and in-bond to/from ground transportation agencies; passengers can transfer to ground service transportation services effectively and efficiently A link between the air and sea industry primarily in the passenger cruise business.
- Ship management.
- To provide parking for the City of Saint John and the patrons using the parking services. The service addresses both short and long term parking needs.
- To provide public transit for the City of Saint John.
- Public & Private Sector Transportation Services.
- The mandate of the Halifax Port Authority includes the regulation of port operations, the administration of Halifax Harbour, the development and management of harbour properties, the provision of port services, and the promotion of international trade through the Port of Halifax.
- INSTRUMAR provides real time information systems to the polymer fibre and aerospace industries using proprietary sensor technologies.
- To operate an aerodrome for civil aviation purposes.
- Providing Municipal Services to the St. John's area.

- Controlling the movement of In Bond goods into and out of Canada.
- Provide marine infrastructure for company in Northeastern New Brunswick.
- Represent trucking industry in Nova Scotia to government officials, suppliers and contractors.
- Provision of environmental services including meteorological forecast services to government and private industry.
- Maersk Canada is agent for Maersk Sealand container line.
- We are a privately owned company providing line run bus service covering most areas in the Province. Our mandate is to increase passenger traffic on our buses, continue to improve our customer service levels and remain profitable.

1.4 WHAT ARE THE KEY EXTERNAL AGENCIES YOU DEAL WITH IN CARRYING OUT YOUR MANDATE?

Each respondent was asked to indicate the various external agencies that they interact with in fulfilling their mandate within the transportation industry. An array of federal, provincial and municipal funding agencies and economic development organizations were noted. Also, there were some references to international markets such as the U.S. Defence and Aerospace industry. The following provides a complete listing of responses:

- Federal, provincial and municipal governments.
- Private industry, provincial, federal and municipal government, and other industry associations.
- New Brunswick Businesses and industries.
- Consulting firms, federal departments and provincial departments, transportation associations.
- Provincial, and Municipal Governments, other consulting firms.
- Our clients are found the world over. We deal with the companies and agencies such as the United Nations, the Department of National Defence, as well as private sector companies in Canada and the U.S.
- Technology and sales partners, corporate clients, investors.
- Emergency responders, members of the public, Municipal Governments.
- We have dealt with and still deal with the City of Saint John Community Planning Department, Municipal Operations, Finance Department, Police Department, Saint John Transit, Provincial Supply and Services Department and other individuals or companies where we lease properties. Also we continually work with cities like Fredericton and Moncton.
- NS Dept of Finance NS Dept of Transportation & Public Works Halifax Regional Municipality.

- IRD inc an ITS solutions Group and Diamond Traffic Services who make counters and classifiers.
- Federal and Municipal governments.
- City of St. John's.
- Government of Canada (i.e., Transport Canada, Environment Canada, Emergency Preparedness Canada) Provincial Departments (Justice, Municipalities, Environment) Municipalities.
- Provincial government, transportation agencies.
- Federal, provincial, territorial, municipal and state governments Institutions and private industries Volunteer organizations.
- Federal government, municipal governments.
- RCMP EMO Municipalities Federal Government.
- Public and private sector transportation (road, rail, marine, utility) agencies Public sector mapping agencies.
- N.S. Transportation & Public Works Halifax-Dartmouth Bridge Commission Transportation Association of Canada.
- ACOA PEI BDI AAFC.
- Various governmental departments. The Canadian Institute of Traffic and Transportation. We are also associated with other associations such as: The Logistic Institute, Canadian Association of Supply Chain & Logistics Management.
- Federal government organizations; not for profit organizations with a socio-economic development mandate and private business.
- Industry, Federal Government, other jurisdictions, special interest groups, i.e. environmental groups, port authorities, airports, road builders, general public, environment Canada, I am new to this position but there are a great many agencies involved in our mandate.
- Federal & provincial regulators, funding bodies.
- Federal funding agencies such as Industry Canada, HRD, ACOA Regional and municipal economic development organizations.
- Provincial Transportation Departments.
- NB Department of Transportation APTA Police and RCMP.
- The four Atlantic provincial governments via Intergovernmental Affairs and direct discussions with line departments.

- Private sector and government transportation and tourism agencies.
- Various government bodies.
- Transport Canada; TIANS; ACTA; Petroleum Directorate; Nova Scotia Business Inc.; Government of Nova Scotia; Halifax Chamber of Commerce; Greater Halifax Partnerships; Greater Washington Partnerships; Canadian Consulates; Governors office of Louisiana; International centre Lafayette; etc.
- Dept of Transport/Transport Canada RCMP.
- CN Rail Halterm Public Trucking Companies Oceanex Halifax Port Corp Revenue Canada Atlantic Pilotage Corp EC Tugs Halifax Employers Association.
- Owners Charterers Government.
- The majority of our dealings are carried out with other city departments or commissions, however, we carry out business with the Province of N.B. (Service N.B., Supply and Services and Motor Vehicle Branch).
- Ocean Carriers Vessel operators and agents Multimodal marine terminals CN Rail Halifax Employers Association Halifax Regional Police and Fire Departments Canadian Coast Guard Various industry groups.
- Honeywell Aerospace.
- Department of National Defence.
- We deal with a lot of external agencies in conducting the business of the City.
- Public Utility Review Boards Nova Scotia, New Brunswick, Prince Edward Island.
- Foreign Affairs, Citizenship & Immigration, Transport Canada, Statistics Canada, Environment Canada, Department of Justice.
- Our tenant, freight service operator and companies in the region.
- Government of Nova Scotia, all agencies Roadbuilders of Nova Scotia.
- Environment Canada Nova Scotia Department of Transportation and Public Works.
- Halterm, CN Rail, Coast Guard, Atlantic Pilotage, Revenue Canada, Agriculture Canada.
- We have working relationships with the Nova Scotia Utility and Review Board, Department of Transportation, Motor Vehicle, Tax Commission as well we are members of the Canadian Bus Association and American Bus Association.

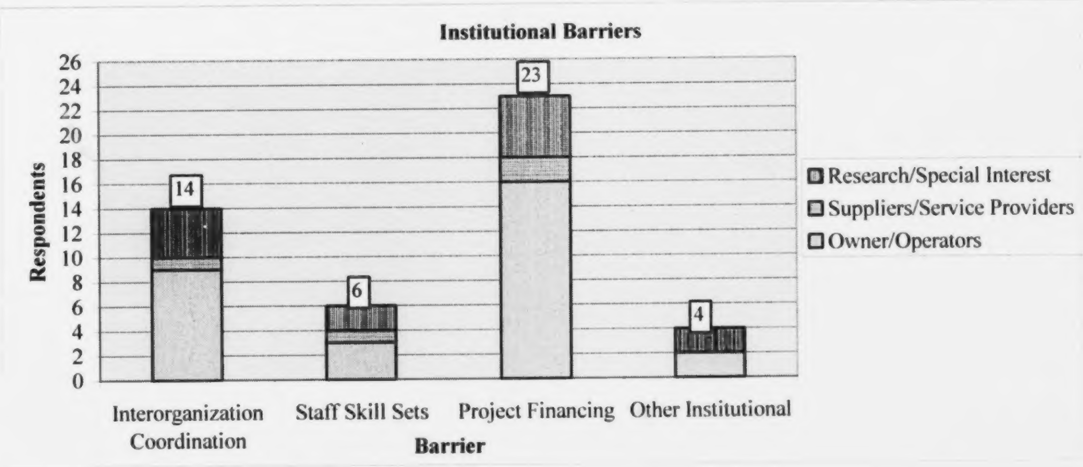
1.5 IDENTIFY ANY OF THE FOLLOWING BARRIERS THAT PREVENT YOUR FROM OPTIMIZING THE TRANSPORTATION RELATED SYSTEMS YOU OWN/OPERATE OR THE SERVICES YOU PROVIDE:

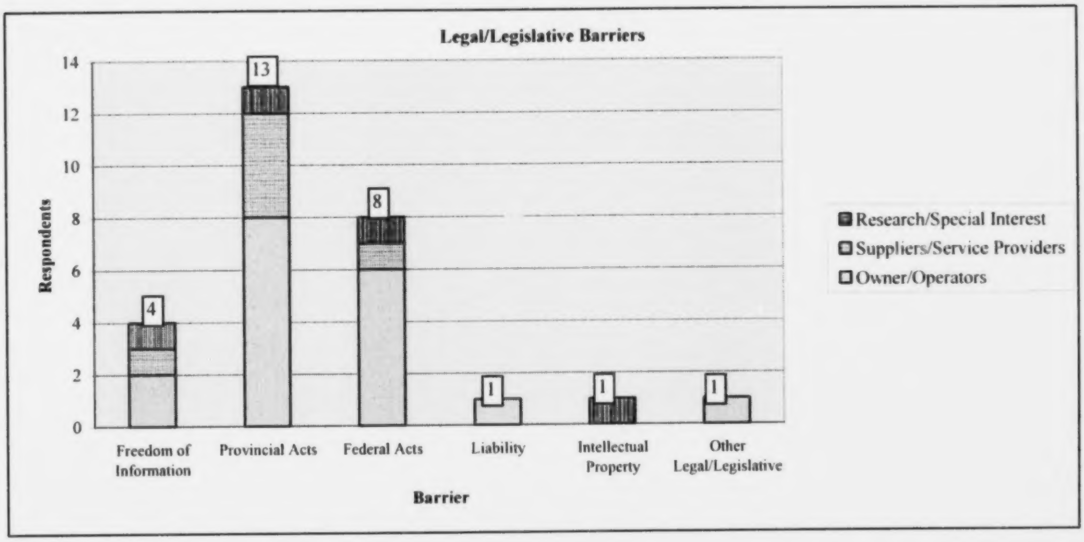
All stakeholders were asked to identify the institutional, legal, and technical barriers they encounter in the delivery of their transportation systems services. As the following charts indicate, the key barriers include:

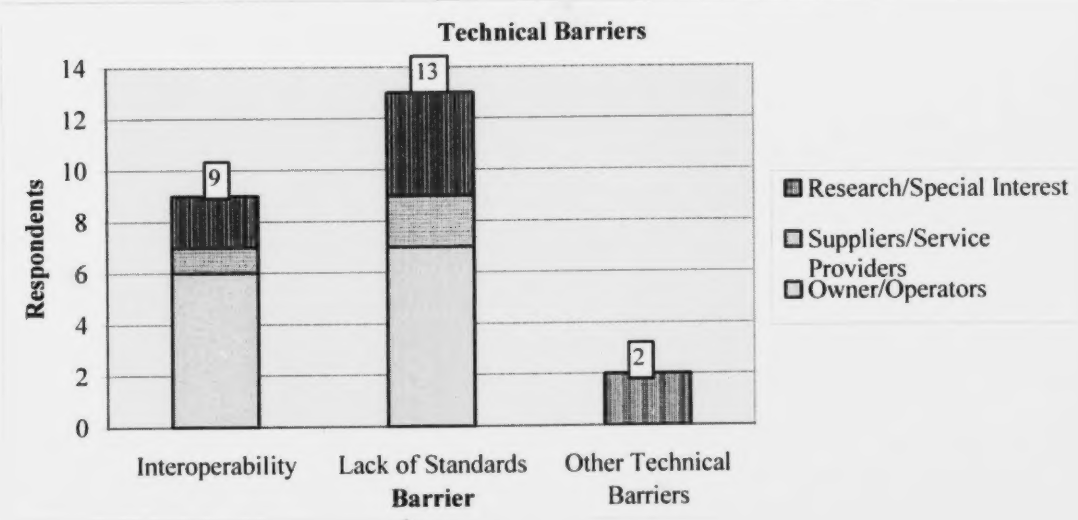
- The inability to raise project financing.
- The inability to achieve interagency coordination and technical interoperability and the associated lack of standards to support this interoperability.
- Issues pertaining to some provincial and federal acts of legislation, such as a lack of harmonization of rules and regulations in the trucking sector.

Some respondents indicated that interagency coordination between U.S. and Canadian authorities would be very helpful in areas such as road-weather information, and commercial vehicle operations.

The following graphs indicate the identification of institutional, legal, and technical barriers, with the responses distinguished according to stakeholder classification.

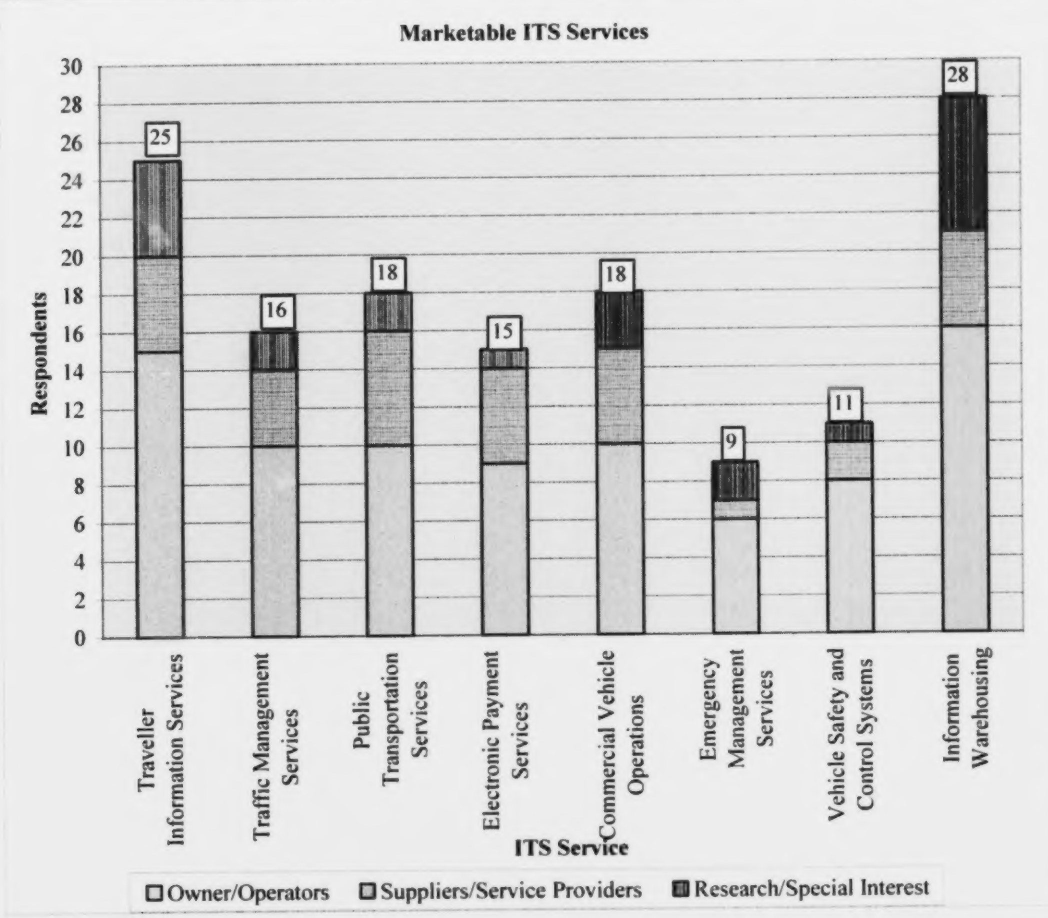






1.6 WHICH ITS SERVICES DO YOU PERCEIVE TO BE THE MOST MARKETABLE OR HELP TO EXPAND YOUR BUSINESS INTERESTS?

Each stakeholder was asked to identify the user service bundle containing the ITS services which they perceive to be the most relevant to their areas of interest. The responses that are shown in the following chart are categorized according to the type of stakeholder. As the chart indicates, there was a heavier weighting in traveller information and the related information warehousing services, reflecting the need to fuse data from a variety of sources and make it available to travellers.



OWNER/OPERATOR QUESTIONS

1.7 SELECT ANY ITS SERVICES THAT YOUR AGENCY IS CURRENTLY INVOLVED WITH OR HAS AN INTEREST IN.

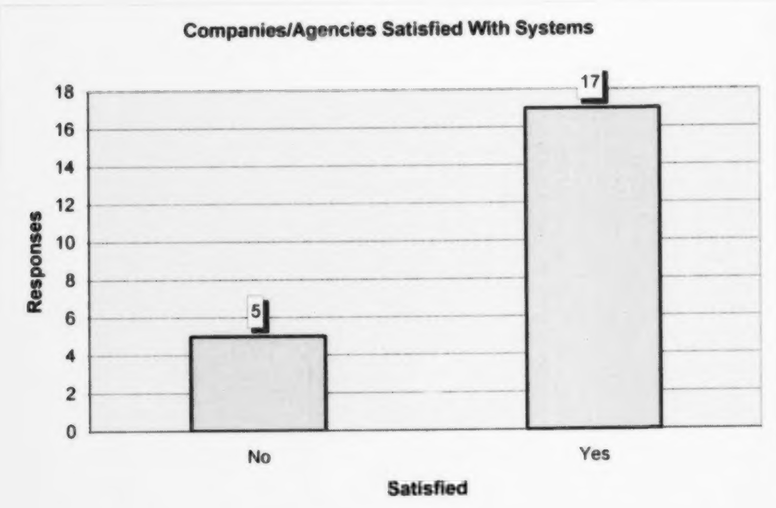
The owner/operator stakeholders were asked to indicate the user service bundles where they currently provide services, as well as the bundles where they would have a future interest in providing services.

	Currently Using	Future Interest	No Interest
Traveller Information Services	11	7	5
Traffic Management Services	8	10	3

	Currently Using	Future Interest	No Interest
Public Transportation Services	5	5	9
Electronic Payment Services	9	9	3
Commercial Vehicle Operations	5	10	8
Emergency Management Services	6	10	4
Vehicle Safety and Control Systems	5	11	6
Information Warehousing Services	4	15	5

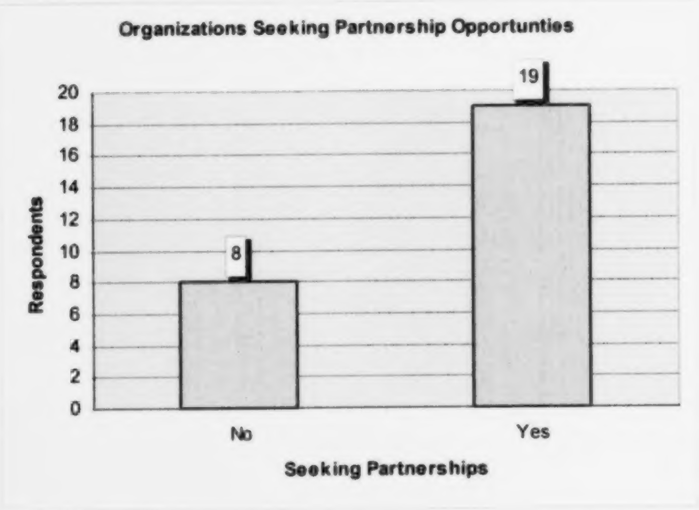
1.8 ARE YOU SATISFIED WITH THE PERFORMANCE OF YOUR ITS APPLICATION(S)?

The owner/operator stakeholders were asked to indicate the level of satisfaction with their ITS applications to date. Some respondents indicated that they are presently at an interim level of development as part of a staged implementation, and anticipate achieving further benefits through ongoing deployment.



1.9 IS YOUR ORGANIZATION IN NEED OF, OR SEEKING, ANY PARTNERSHIP OPPORTUNITIES TO IMPROVE YOUR BUSINESS?

Owner/operators were asked to indicate their experience in seeking partnerships for the deployment of ITS, summarized as follows:



1.10 RATE THE BENEFITS OF ITS SERVICES THAT YOUR AGENCY IS CURRENTLY EXPERIENCING.

Owner/operators were asked to indicate the relative importance of the benefits of the ITS applications that they are experiencing, summarized in the following chart:

	Very Important	Important	Somewhat Important	Least Important
Customer Satisfaction	18	2	2	0
Increased Revenues	10	4	3	5
Improved Operating Efficiencies	15	7	1	0
Reduction of Pollution	9	5	5	3
Improved Safety	16	4	2	0

SUPPLIER/SERVICE PROVIDER QUESTIONS

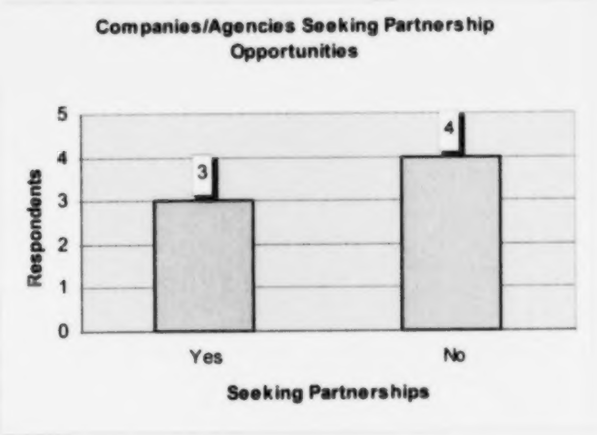
1.11 SELECT ANY ITS SERVICES THAT YOUR COMPANY/AGENCY IS CURRENTLY INVOLVED WITH.

Suppliers and service providers were asked to indicate the ITS services which they are presently involved with or may have a future interest in, organized according to the user service bundles as follows:

	Currently Using	Future Interest	No Interest
Traveller Information Services	3	1	4
Traffic Management Services	1	3	3
Public Transportation Services	5	2	1
Electronic Payment Services	3	4	0
Commercial Vehicle Operations	2	3	3
Emergency Management Services	2	2	2
Vehicle Safety and Control Systems	3	1	3
Information Warehousing Services	2	4	1

1.12 IS YOUR ORGANIZATION IN NEED OF, OR SEEKING, ANY PARTNERSHIP OPPORTUNITIES TO IMPROVE YOUR BUSINESS?

Suppliers/service providers were asked to indicate their interest in seeking partnerships to enable ITS deployment, with the responses summarized as follows:



1.13 RATE THE BENEFITS OF ITS SERVICES THAT YOUR COMPANY/AGENCY IS CURRENTLY PROVIDING.

ITS industry suppliers/service providers were asked to rate the relative significance of the benefits of the products and services they are able to provide to their clients:

	Very Important	Important	Somewhat Important	Least Important
Customer Satisfaction	3	0	1	0
Increased Revenues	3	0	1	0
Improved Operating Efficiencies	3	1	0	0
Reduction of Pollution	0	2	0	1
Improved Safety	2	1	0	0

RESEARCH AND SPECIAL INTEREST GROUP QUESTIONS

1.14 WHAT ITS SERVICES DO YOU SEE AS HAVING THE MOST SIGNIFICANT IMPACT IN THE NEXT 5 YEARS?

Researchers and special interest groups were asked to indicate their view on the most significant ITS services, organized according to the user service bundles as shown in the following chart:

	Significant Impact	Moderate Impact	No Impact
Traveller Information Services	6	4	1
Traffic Management Services	7	5	0
Public Transportation Services	3	9	1
Electronic Payment Services	7	3	1
Commercial Vehicle Operations	7	3	2
Emergency Management Services	8	4	0
Vehicle Safety and Control Systems	5	7	0
Information Warehousing Services	8	3	1

1.15 DESCRIBE YOUR OVERALL EXPERIENCE IN DEALING WITH VARIOUS OWNER/OPERATORS OF ITS IN THE ATLANTIC PROVINCES.

Researchers and special interest groups were asked to provide comments on their experience in dealing with operating ITS applications in the Atlantic Region, listed as follows:

- Airline service is now expensive and poorly scheduled for the changing North South IT world.
- Mostly, experience with Québec, Ontario and US states. But, in the Canadian Roadweather Information System project, all Atlantic Provinces are involved; I produced for the provinces and Environment Canada a "first draft" together with Paul Delannoy (EC).
- Very little experience to date.
- No experience. We provide technology that can be used by companies in the transportation sector.
- Besides discussing the E.Pass issues, it has not been a big issue for us.
- A supply side mentality is predominate.
- Developed a procedural guide and computer application for updating GIS road data for NBDOT; produced a number of digital nautical navigational charts in the Atlantic region.
- Have done GIS consulting for Nfld WST.

- We have provided pavement temperature and general weather forecast services to the NSDOT&PW. We have had discussions with NB Road Maintenance Inc. on providing services in New Brunswick.

- Limited potential for ITS deployment in Atlantic Canada outside CVO and electronic payment. Perhaps some use of traveller info systems.

1.16 DESCRIBE YOUR PARTNERING EXPERIENCE WITH OTHER ORGANIZATIONS.

Researchers and special interest groups indicated the following comments pertaining to their experience with partnering with other organizations:

- Have partnered with several organizations involved in review and report writing. Also involved in a major highway project Maritime Road Development as Industrial Benefits Manager and assisting the Manager of Communication and Public Relations.

- Good way to grow.

- Joint ventures with other private consultants to undertake projects.

- None regarding ITS.

- Since we are in education, we must update constantly our material, therefore we are in contact with other organizations to provide us with what is happening in the industry. Our graduates must be aware of what is going on out there and actively participate in bringing forward new techniques and ways of doing things.

- Have partnered with provincial agencies and departments and many private sector organisations.

- Have partnered extensively with public, private, and academic entities.

- We have worked with equipment suppliers and other meteorological services providers in Canada.

1.17 WHAT DO YOU FEEL NEEDS TO BE DONE TO PROMOTE PARTNERSHIPS IN THE AREA OF ITS RESEARCH IN THE ATLANTIC PROVINCES?

Researchers and special interest groups provided the following recommendations for actions targeting the promotion of partnerships for the research and development of ITS applications in the Atlantic Region:

- Promote the benefits of ITS as an economic development tool, and promote partnerships as an important factor for successful ITS's.

- Among other things, use this strategic plan effort to identify a pool of resources on whom to build, identify needs of the industry in the Atlantic provinces, identify niches best suited to the combination of resources and needs, find or organize a lead agency to manage a program of research which would come from a consensus of the stakeholders. It is a very open question on which one could dissert logically.

- Further studies similar to this but concentrating on infrastructure improvements, i.e. faster ferry vessels, additional four lane highways, etc.
- Interest group, networking opportunities.
- Demonstration of viable applications Identification of clients.
- There must be a direct partnership between the educators, the carriers, the users, and the regulators. There is strength is numbers and until we recognize this we will always lag behind. We have a very small population scattered on a large territory; which creates major logistics problem for all the players involved. We should, first of all, educate the population as a whole on the importance of transportation; what impact it has on their daily lives and then convince the various players to overlook the competitive aspect and invest in education and research. This is being done in Europe and works very well, everyone wins and it makes a much healthier industry.
- Broaden your definitions of key sectors; stop quasi-official support for the "own or block" policies of major incumbents.
- The senior political and management levels of each provincial agency responsible for transportation must place a high priority on developing true partnerships in ITS.

1.18 IS OUR EDUCATION SYSTEM GEARED TO PRODUCING STAFF/EMPLOYEES WITH THE KNOWLEDGE OF ITS TO MEET FUTURE NEEDS OF THE ITS INDUSTRY IN THE ATLANTIC PROVINCES?

Researchers and special interest groups provided the following responses regarding the ability of the current education system to produce staff with the knowledge to meet the needs of the ITS industry. Accompanying comments are provided, as shown in the following chart:

No	Education will need to be combined with experience/knowledge in transportation for leaders in the ITS industry. However, once champions have a direction and action plan, the education system is sufficient for producing skilled people for the ITS industry.
No	Physical Distribution formal studies.
Yes	But it may need clear indications of what specializations are necessary.
No	Educational institutions need to retool.
No	In order to obtain the knowledge, the educators must, first of all, do the research. Research doesn't come cheap, therefore, there must be funding available for it. Also, the educators must be allowed the necessary time and resources to get involved in the research.
No	In our sector of it, the education needs to move away from its current focus on vendor-based qualifications.
No	The education system must look at the educational requirements of workers and develop programs to train people in the skills required to operate ITS.

1.19 WHAT ITS SERVICES DO YOU PERCEIVE AS BEING DESIRED THE MOST BY TRAVELLERS?

Researchers and special interest groups provided the following commentary pertaining to the most desired ITS user services, organized by user service bundle as follows:

	Very Desirable	Somewhat Desirable	Not Desirable
Traveller Information Services	8	2	0
Traffic Management Services	5	5	0
Public Transportation Services	4	5	0
Electronic Payment Services	4	4	1
Commercial Vehicle Operations	5	4	0
Emergency Management Services	7	5	0
Vehicle Safety and Control Systems	6	2	0
Information Warehousing Services	3	4	3

1.20 WHAT ARE THE PERCEIVED EFFECTS OF ITS SERVICES ON TRANSPORTATION SAFETY?

Researchers and special interest groups provided the following comments on the effects of ITS on transportation safety:

- Security would not be high enough.
- They should always improve safety but at different levels depending on the type of services.
- It should assist in a major way to improve highway safety.
- Since September 11, we all have seen how important safety is for everyone. Most carriers have suffered some kind of consequence. It is said that perception is reality, so we must make the general public feel at ease again when it comes to transportation issues and I am not talking only about passenger transportation. The freight carriers are constantly pictured by the medias as being the bad ones when something happens. As an industry we must talk a lot more about safety and what we are doing about it to ease the public's fears. ITS has certainly a role to play in providing the tools and/or the information required.

- Safety will be improved.

1.21 WHAT DO YOU FEEL NEEDS TO BE DONE IN ORDER TO INCREASE PUBLIC AWARENESS OF THE BENEFITS OF ITS?

Researchers and special interest groups provided the following comments regarding actions to increase the awareness of ITS benefits:

- Information sessions, newspapers advertising, focus groups, etc.

- To be aware, you must first be informed and I think that the safety aspect is one that the public is rather keen on, so information on safety aspects of ITS services should be a priority.

- There will be a need for a major publicity campaign just to make the public aware that something major is going on to improve their "driving" in the Atlantic area.

- Major campaign. ITS has virtually no public awareness.

- Demonstratible applications.

- This is not going to be an overnight solution. We must beat our message in and change our image. Let's put in place the proper system and then as an industry start beating the drums to let everyone know what we doing and how important we are to the general public. I feel sometimes we are our worst enemies, we certainly don't communicate very well as an industry.

- What are those benefits?

- A public education program should be implemented.

APPENDIX C

User Needs Focus Groups Summary

ITSAtlantic.com

October 25, 2001

ATLANTIC PROVINCES
REGIONAL ITS STRATEGIC PLANNING STUDY
USER NEEDS FOCUS GROUP

AGENDA

SIGN-IN AND REFRESHMENTS (30 minutes) (9:30 a.m. – 10:00 a.m.)

INTRODUCTORY SESSION (1 hour) (10:00 a.m. – 11:00 a.m.)

Objective: to prepare participants to identify and prioritize ITS user needs, to make constructive contributions to the strategy development

Activities:

Introduction:
- Welcome and Opening Remarks – Steering Committee representative
- Introduction of Participants
- Introduction of Facilitators – explanation of objectives of the roundtable, and the agenda

ITS Overview:
- Description of Atlantic Provinces Draft ITS Vision
- Overview of the Canadian ITS Architecture
- Description of ITS User Services
- Discussion of the traditional barriers to ITS implementation

Break (15 minutes) (11:00 a.m. – 11:15 a.m.)

Development of Strategy Focus (45 minutes) (11:15 a.m. – noon)

Objective: to focus the strategy development on the needs and components considered to be of greatest importance

Activities:

Overview:
- Summary of the results of the web survey
- Description of the Strengths, Weaknesses, Opportunities and Threats (SWOT) process

SWOT Analysis:

- Consultant team provides some preliminary thoughts on Atlantic Provinces Strengths, Weaknesses, Opportunities and Threats
- Participants formed into groups of five

- Each group performs a SWOT analysis – context – ITS implementation in the Atlantic Provinces
- Each group presents additional or different results to entire group

Lunch (30 minutes) (noon – 12:30 p.m.)

Development of Strategy Focus (cont) (30 minutes) (12:30 p.m. – 1:00 p.m.)

User Service Prioritization:

- Names of the 8 user service bundles, and the 35 user services posted on walls
- Each participant is given markers to select 10 user services deemed to have the highest priority
- Results will be tallied

Development of Strategies (1 hour) (1:00 p.m. – 2:00 p.m.)

Objective: to actively involve the participants in the development of strategies

Activities:

Summary of the Results of the User Service Prioritization

- Consultant team provides a summary of the results from the previous activity

Strategy Development Process (Group Breakout)

- Five strategy groups identified (ATMS and Emergency Management, ATIS and Information Warehousing, CVO, Public Transport, Electronic Payment)
- Strategy Group leaders identified (may be selected in advance of roundtable)

Strategy Development

- Strategy Group Leaders oversee the development of a brainstorming session for the assigned User Service Bundle(s)
- Group to brainstorm and record a number of potential projects, based on the prioritization exercise
- Group to consider ITS goals, the needs, and the draft ITS vision
- Group to identify the benefits, champions, risks, and implementation timeframe
- Group to identify early winners, and perform an assessment
- Consultant team provides forms and materials to aid the participants in developing the strategy

Break (15 minutes) (2:00 p.m. – 2:15 p.m.)

Strategy Presentation (30 minutes) (2:15 p.m. – 2:45 p.m.)

Objective: to inform all participants of the developed strategy, and provide and opportunity for input

Activities:

- Group leaders present results

Closing (15 minutes) (2:45 p.m. – 3:00 p.m.)

Objective: to obtain feedback on the strategic plan development process, and specifically the Atlantic Canada ITS Vision

Activities:

- Ask the participants to make comments on the strategic plan development process, the focus group, and suggested activities to ensure ongoing participation of the stakeholders
- Provide opportunity for the stakeholders to provide both oral and written input

NEW BRUNSWICK
Moncton, November 5

Representative	Company/Agency	Telephone #	Fax #	Email
Nancy Lynch	New Brunswick Department of Transportation	506-453-2802		nancy.lynch@gnb.ca
Dave Macfarlane	New Brunswick Department of Transportation - Policy	506-453-2600		Dave.Macfarlane@gnb.ca
Real Robichaud	Tourism Industry Association of New Brunswick	506-458-5646		realr@tianb.com
Roger Saunders	Transport Canada	506-851-7573		saunder@tc.gc.ca
Don Mason	New Brunswick Department of Transportation - Policy	506-453-2213		Don.Mason@gnb.ca
Rod Cunningham	New Brunswick Tourism	506-453-8731		Rod.Cunningham@gnb.ca
Richard Smith	Saint John Parking Commission	506-649-6009		richard.smith@city.saint-john.nb.ca
Tyrone Parsons	New Brunswick Department of Transportation - Radio Communications	506-453-3393		tyrone.parsons@gnb.ca
Robert Theriault	Royal Canadian Mounted Police - Fredericton	506-452-3452	506-452-3312	bob.theriault@rcmp.grc.gc.ca
Annette Kinder	CVE/Salisbury Scales	506-372-3290		annette.kinder@gnb.ca
Jean-Marc Thibodeau	CVE Public Safety New Brunswick	506-856-2879/ Cell: 506-536-7003		jeanmarc.thibodeau@gnb.ca
Suzanne Archibald	New Brunswick Tel	506-452-4391		Suzanne.Archibald@nbtel.nb.ca
Michael Likely	Day and Ross Group	506-375-5113		mblikely@dayandrossinc.ca
Al Soppitt	Saint John Port Authority	506-636-5611	506-636-4443	asoppitt@sjport.com
Austin MacPhee	Canada Customs	506-636-5595		Austin.Macphee@ccra-adrc.gc.ca
Roger Shannon	City of Fredericton	506-460-2442		shannonr@city.fredericton.nb.ca
Stephane Thibodeau	City of Moncton	506-383-6718		stephane.thibodeau@moncton.org
Don Good	ADI Limited	506-451-7461		dcg@adi.ca
Peter Vuillemot	SVG Consulting, Inc.	506-372-9198		vuillemo@nbnet.nb.ca
Jack Keir	Saint John Harbour Bridge Authority	506-635-1320		sjhb@nbnet.nb.ca
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Dale Thibodeau	NB Southern Railway/ Sunbury Transport	506-453-7655		thibodeau.dale@sunburytransport.com
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PRINCE EDWARD ISLAND

Charlottetown, November 6

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NOVA SCOTIA
Halifax, November 7

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NEWFOUNDLAND
St. John's, November 8th

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IBI
GROUP

Memo

To:	Project Steering Committee Focus Group Participants	Date:	December 11, 2001
From:	Project Team	Steno:	ss
cc:		File No:	TO-8921

Subject: ***Atlantic Provinces Regional ITS Strategic Planning User Service Focus Groups - Summary Report***

INTRODUCTION

As you are aware, a series of user service focus groups were conducted on four consecutive days commencing Monday, November 5th, 2001 and finishing on Thursday, November 9th, 2001. The major activities in each workshop included:

- Introduction to the Workshop.
- Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis.
- Identification of higher priority user services.
- Identification of "early winner projects".

A summary of the results from the four focus groups is provided below.

NEW BRUNSWICK

There were 25 attendees. The participants included:

- Transport Canada;
- Province of New Brunswick, Department of Transportation;
- New Brunswick Tourism;
- municipalities (Fredericton, Moncton)
- Saint John Harbour, Saint John Bridge Authority, and Saint John Parking Commission;
- University of New Brunswick;
- New Brunswick Tel;
- RCMP; and
- commercial carriers.

PRINCE EDWARD ISLAND

There were 12 attendees. The participants included:

- PEI Transportation and Public Works, and Development and Technology staff;
- Confederation Bridge;

- bus operator;
- trucking firm;
- wireless communication provider;
- GIS firm.

NOVA SCOTIA

There were 14 attendees. The participants included:

- Nova Scotia Transportation and Public Works;
- Halifax Transit;
- Halifax Port Authority;
- Halifax – Dartmouth Bridge Commission;
- Halifax Airport;
- Canada Customs and Revenue Agency;
- Atlantic Provinces Trucking Association.

NEWFOUNDLAND AND LABRADOR

There were 19 attendees. The participants included:

- Transport Canada;
- Newfoundland Department of Works Services and Transportation;
- St. John's Transit and Traffic staff;
- Goose Bay Airport;
- Aliant Telecom;
- ACOA.

SWOT ANALYSIS

The participants performed a SWOT analysis for each of the eight User Service Bundles. The facilitators provided tables with an initial effort to describe the strengths, weaknesses, opportunities and threats for each of the User Service Bundles. The participants were told that they could accept, reject or modify the points provided by the facilitators. They were invited to complete the tables as they pertain to the individual respective province. Some key items of note include:

TRAVELLER INFORMATION SERVICES

New Brunswick

Opportunities	Tie in as part of new freeway opening in New Brunswick.
Threats	Low traffic demand.

Prince Edward Island

Weaknesses	Lack of corporate head offices inhibits development of technology. Overhead of public services delivery in region with a small tax base.
Threats	Telecom's policy to own new services.

Nova Scotia

Weaknesses	No central pool of information.
Opportunities	Use of commercial fleet management services to provide traveller information.

Newfoundland and Labrador

Strengths	Web-based cell services including location based services pilot project.
Threats	Inability to implement cost sharing schemes with four provinces and the private sector.

TRAFFIC MANAGEMENT

New Brunswick

Strengths	Extensive historical data.
Opportunities	Strong funding for technical applications at various levels of government.

Prince Edward Island

Strengths	Existing RWIS data map on web site.
Opportunities	RWIS – participation on national RWIS panel.

Nova Scotia

Strengths	Some experience to date with RWIS and SCOOT.
Opportunities	Tag-equipped vehicles as probes. Campaign for work zone safety awareness.

Newfoundland and Labrador

Strengths	St. John's experience with wireless communication to traffic control signals.
Opportunities	Opportunity to demonstrate ITS as an environmental program.

PUBLIC TRANSPORT SERVICES

New Brunswick

Weaknesses	No link between transit funding and gas taxes.

Prince Edward Island

Strengths	Catering to seniors' market in Charlottetown.
Weaknesses	Lack of reliability and appropriate schedules as controlled by government.
Opportunities	Opportunity to reduce costs of service delivery, e.g. use school buses off-peak for other services.

Nova Scotia

Strengths	Passenger information displays at terminals.
Weaknesses	Integrate fare collection and scheduling software.
Opportunities	Multi-mode smartcard, partnered with cruise ship industry and airport parking authority.
Threats	Media reluctance to report on transit operations.

Newfoundland and Labrador

Strengths	Mile One shuttle service. Transport Canada GPS pilot project.
Opportunities	Memorial University partnership.

ELECTRONIC PAYMENT SERVICES

New Brunswick

Strengths	Nova Scotia firm developed pay and display for parking. Saint John bridge experience. Interoperability with Halifax – Dartmouth bridges.
Opportunities	Saint John Bridge expand electronic payment to Saint John parking; retailers.
Threats	Who controls back office?

Prince Edward Island

Weaknesses	Point of service front end is unique to each bank. Set up of debit account can be a barrier for small operators.
Threats	Opportunities for hidden transaction fees or taxes.

Nova Scotia

Strengths	MacPass experience
Weaknesses	No common clearinghouse.
Opportunities	More peripheral uses such as traffic management.

Newfoundland

Strengths	With a small community, it is easy to integrate with other partners.
Threats	Lack of clear champion in the community.

COMMERCIAL VEHICLE OPERATIONS

New Brunswick

Strengths	Significant fleet management technology in place. An established community of carriers.
Weaknesses	Important to achieve compatibility with north-eastern states. Incomplete wireless communications coverage.
Threats	Increased security concerns at border crossings.

Prince Edward Island

Strengths	Weigh-in-Motion experience.
Weaknesses	Truck safety inspection is not uniform across the provinces, i.e. need to harmonize standards.
Opportunities	Ongoing movement to electronic data interchange. Integration of ferry system.

Nova Scotia

Weaknesses	Lack of Hazmat standards. Canada-U.S.-Mexico – no way to track location.
Opportunities	Perimeter security at ports.

Newfoundland and Labrador

Weaknesses	Small size and low volumes. The carrier headquarters are outside of province.
Opportunities	Security of Come-By-Chance refinery shipments to U.S.

EMERGENCY MANAGEMENT SERVICES

New Brunswick

Strengths	Consolidation of public safety organizations in New Brunswick.
Weaknesses	Lack of wireless coverage in rural areas.
Opportunities	New Brunswick wireless spectrum allocation for EMS currently under negotiation. New Brunswick announcing priority on security.

Prince Edward Island

Strengths	A common GIS for the island.
Weaknesses	RCMP cruisers cannot communicate inter-provincially (different radio systems). Inability to communicate between agencies, e.g. RCMP and ambulance services.

Nova Scotia

Weaknesses	Decentralized dispatches. Lack of consistency in road naming conventions and signage.

Newfoundland and Labrador

Weaknesses	Failed attempt to have one province-wide radio network. Marine users are calling 911 instead of using Coast Guard VHF.

There was less input on the remaining two bundles, namely "Information Warehousing Services" and "Vehicle Safety and Control". However, under "Vehicle Safety and Control", one suggestion was that New Brunswick, for example, could be a test bed for rural environment safety features, including wild life collisions and ATV/snowmobile collisions.

IDENTIFICATION OF HIGHER PRIORITY USER SERVICES

In consideration of the four focus group proceedings, the following user services were identified as having the highest priority within the Atlantic Region:

1.1	Traveller Information
1.4	Traveller Services and Reservation
2.1	Traffic Control
2.2	Incident Management
2.4	Environmental Conditions Monitoring
2.5	Operations and Maintenance
2.6	Automated Warning and Enforcement
3.1	Public Transport Management
4.1	Electronic Payment
5.1	Commercial Vehicle Electronic Clearance
5.5	Intermodal Freight Management
5.6	Commercial Fleet Management
6.1	Emergency Notification and Personal Safety
6.3	Disaster Response and Management
6.4	Emergency Vehicle Management
8.1	Weather and Environmental Data Management.

The New Brunswick session included a detailed assessment of the following user services:

1.1	Traveller Information
2.2	Incident Management
4.1	Electronic Payment
5.1	Commercial Vehicle Electronic Clearance
8.1	Weather and Environmental Data Management

IDENTIFICATION OF 'EARLY WINNER PROJECTS'

The following is a brief description of the early winners identified by the participants in the focus groups.

New Brunswick

1. Incident Management – Develop/enhance coordinated response to events.
2. Electronic Payment – Expand transponders to be used in areas other than toll collection (i.e. parking, fuel retail).
3. Commercial Vehicle Administration Process.

Prince Edward Island

4. Public Transport Services – Optimize fleet, GPS, private and public bussing integration.
5. Incident Management – Locate collisions and video on GIS-T.
6. Environmental Conditions Monitoring – Province-wide RWIS integration with Department of Agriculture and national system.

7. Traffic Monitoring and Control of Arterial Networks – Adapted traffic signal system for greater Charlottetown area to strengthen north-south and east-west corridors.
8. Emergency Vehicle Management – Integration of emergency services communication.
9. Electronic Payment Services –Commercial vehicles using Confederation Bridge.
10. Traveller Services and Reservations – Integrate data from various sources and disseminate over various media to facilitate travel decisions.

Nova Scotia

11. Enroute Transit Information.
12. Public Travel Security.
13. Transit Traffic Signal Pre-emption/Priority.
14. Consolidating "Just in Time" Information Gathering and Dissemination for all Modes of Transport.
15. Initiate Inter-modal Network – Based on EDIport.
16. Electronic Payment – Expand MacPass to Marine Atlantic, Bay Ferries, and parking operators.
17. Centralized Traveller Information System – 1-800, web, HAR.

Newfoundland and Labrador

18. Province-Wide Weigh-in-Motion Program.
19. Interactive Traveller Information – Provide road conditions, traffic, weather via wireless network. Priority areas are Argentia and Port Aux Basques.
20. Red Light Camera Pilot Project.
21. Implement Transportation Smartcard.
22. Signal Pre-emption for Priority Areas where fire response level of service is a concern.
23. Traffic Responsive Signal System Fixed Frequency Radio connected.

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEW BRUNSWICK FOCUS GROUP

User Services: Traveller Information Services

Strengths	Weaknesses	Opportunities	Threats
• Public acceptance & expectations • Strong tourism industry • Telecommunications infrastructure • Weather information • Tourism information • Data collection from municipalities	• Lack of interoperability and information sharing • Policies/legislation do not support partnering • Lack of inter-agency co-ordination • Credit card security • Edmunston area example • Need complete listings for any given City	• Integration of ferry service schedules • Travel information distribution for tourism/trade • Lessons learned from others – e.g. TRIP USA • Using/increasing capabilities of commercial products/services • Increased penetration of mobile communications devices • Web-based products • Tie in as part of new freeway opening in New Brunswick	• Protection of intellectual property • Inability to form partnerships • Inability to establish business case • Lack of ongoing funding • Ability for small businesses to access • Information overload for users • Low traffic demand

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEW BRUNSWICK FOCUS GROUP

User Services: Traffic Management

Strengths	Weaknesses	Opportunities	Threats
• Public acceptance • Fewer Agencies to co-ordinate • Mature ITS industry • Good ITS mentality within some agencies • Some experience to date e.g. RWIS • Specific needs to address – rural safety, operations and maintenance, extreme climate • Extensive historical data	• Perception that ITS only applies to urban congestion • No process to focus funding at the provincial or municipal level • Lack of inter-agency coordination • Policies/legislation do not support partnering • Politicians and Public do not fully understand the benefits of ITS • Lack of ITS mentality within some agencies • Not enough data sharing • Communication among municipalities – Learn from one another	• Lessons learned from others e.g. US rural corridors • Focus on improved safety and incident response • Federal interest is growing, which may be tied to federal funding • Opportunity to demonstrate ITS as an environmental program • Dialogue with others, e.g. public transport • Strong funding for technology applications at various levels of government	• Lack of funding • Perceived lack of demand • Lack of awareness at political level • Tendency to overrule expert opinions

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEW BRUNSWICK FOCUS GROUP

User Services: **Public Transport Services**

Strengths	Weaknesses	Opportunities	Threats
• Regional GIS industry skill sets • Various scheduled and charter intercity services	• Declining ridership • Provincial incentive for expansion is reduced • Lack of interagency/system integration • No link between transit funding and gas taxes	• Help improve attractiveness of transit option • Smartcard/fare integration expansion • Commitment to Kyoto standard • Opportunities to reduce costs of service delivery	• Reduced transit funding • Vehicle-centric environment

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEW BRUNSWICK FOCUS GROUP

User Services: Electronic Payment Services

Strengths	Weaknesses	Opportunities	Threats
• Existing systems • Strong industry (tolling, Smartcard) • Societal acceptance of electronic tolling • Banking structure within Canada • Revenue application • Proven technology • Pays for itself • Nova Scotia firm developed pay and display for parking • Canadian experience with debit cards • CVO seeks electronic payment capability • Saint John bridge experience • Interoperability with Halifax-Dartmouth Bridges	• Lack of integration amongst required parties (e.g. financial institutions, payment systems, etc.) • Institutional issues • Lack of universally accepted standards • Local knowledge	• International standard movements (ISO, ASTM) • Commitment to Kyoto standard • Reducing operating costs • Partnering with various related stakeholders e.g. parking, retailers • Saint John Bridge, e.g. – Saint John Parking – Tim Hortons – Fuel retailers • Pay CVO credentials – Service New Brunswick	• Institutional barriers (lack of autonomy) • Public concerns about privacy issues • Demonstrate cost effectiveness • Who controls back office? • Technology obsolescence

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEW BRUNSWICK FOCUS GROUP

User Services: Commercial Vehicle Operations

Strengths	Weaknesses	Opportunities	Threats
• Experience with continental programs • International co-operation efforts (NAFTA) • Good regulatory environment • Significant focus on truck safety • Significant fleet management technology in place – weakness for small fleets to access • Regional GIS industry strengths • Less concerns about the "big brother" syndrome • Multiple modes • APTA relationship with province • Carriers can develop business case for participation • Established community of carriers	• Lack of funding limiting full implementation • Institutional differences between Canada/US for information sharing • Legislative restrictions on data exchange • Ability of independent truckers to access programs • Important to achieve compatibility with northeastern states • Incomplete highway system • Incomplete wireless communications coverage	• Expand into courier industry • Provide real time information • Partner with existing fleets • High cross-border traffic demand (NB) • High percentage of commercial vehicles • Expand WIM • Federal and provincial government interest in gateways and priority corridors • Increased needs for efficient movements at border crossings in light of delays related to security concerns. • Optimization of multi-modal terminals • National CVO programs • Ongoing movement to Electronic Data Interchange and E-Commerce • Increased demand for movement through ports • Technologies are affordable • Carriers can participate as information providers	• No buy-in from the user community • Privacy, loss of competitive advantage • Lack of funding • End of consumer resistance to added cost • Increased security concerns at border crossings • Absence of standards for information exchange

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEW BRUNSWICK FOCUS GROUP

User Services: Emergency Management Services

Strengths	Weaknesses	Opportunities	Threats
• Municipal consolidation, reducing agencies further e.g. Moncton • RCMP-regional coverage • Regional GIS industry strengths • Consolidation of public safety organizations in New Brunswick	• Interagency barriers – information sharing, control at the scene • Minimal focus of emergency agencies on transportation • Lack of agreed-upon incident management procedures • Lack of management of towing industry • Lack of standards for in-vehicle applications e.g. Mayday • Lack of funding • Lack of wireless coverage in rural areas • Communication coordination between agencies at the scene	• Renewed focus on emergency preparedness • Onboard equipment of emergency vehicles (in-vehicle navigation, communications) • Apply commercial fleet management systems to public services • Signal pre-emption programs • Penetration of E911 • Commercial Mayday services • New Brunswick announcing priority or security • New Brunswick wireless spectrum allocation for EMS currently under negotiation	• Lack of available funding • Change in government

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEW BRUNSWICK FOCUS GROUP

User Services: **Information Warehousing Services**

Strengths	Weaknesses	Opportunities	Threat
• Existing RWIS programs • Planned national RWIS program • Web site and 1-800 # for weather information • New Brunswick active in this area	• Legislative restrictions regarding Canada/US information sharing in CVO • No incentive to coordinate data • Present systems cannot provide enough real-time data • Capability of existing computer systems	• Better information from various ITS applications • Work with private fleet information systems to provide accurate real-time information • Build upon data from RWIS road maintenance deployment • Trucking companies need information • New Brunswick DOT – disseminates information to media, emergency dispatch (not real-time) • Revenue opportunities	• Lack of funding • Reduced funding affects quality of data (e.g. collision reporting centres) • Lack of lead agency • Policies for data distribution • Lack of employee buy-in and awareness • Privacy of data

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEW BRUNSWICK FOCUS GROUP

User Services: Vehicle Safety and Control

Strengths	Weaknesses	Opportunities	Threats
• 3 main trucking companies – Armour – McCain – Irving	• Automotive manufacturing oriented only • Lack of public infrastructure support	• Early applications for specialty vehicles e.g. snow ploughs, heavy vehicles • Research initiatives • New Brunswick testbed – Rural environment – Wildlife collisions – ATV/snowmobile collisions • UNB vehicle safety program • MRDC project	• Legal liabilities • Other countries (Europe, Japan, US) taking lead in product development

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEWFOUNDLAND & LABRADOR FOCUS GROUP

User Services: Traveller Information Services

Strengths	Weaknesses	Opportunities	Threats
• Public acceptance & expectations • Strong tourism industry • Telecommunications infrastructure • Hardware devices already exist • St. John's – GIS • Business case for specific users, e.g. fleet operators • Web-based cell services, including LBS pilot	• Lack of interoperability and information sharing • Policies/legislation do not support partnering • Lack of inter-agency co-ordination • 10% province-wide GIS coverage • Privacy of data • Uptake of technologies • Difficulty in PPP • Need to establish public willingness to pay	• Integration of ferry service schedules • Travel information distribution for tourism/trade • Lessons learned from others – e.g. TRIP USA • Using/increasing capabilities of commercial products/services • Increased penetration of mobile communications devices • Web-based products • Re-routing opportunities • Advertising potential	• Lack of funding • Protection of intellectual property • Inability to form partnerships • Inability to establish business case • Ability to implement cost sharing schemes with 4 provincial governments and the private sector

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEWFOUNDLAND & LABRADOR FOCUS GROUP

User Services: Traffic Management

Strengths	Weaknesses	Opportunities	Threats
• Public acceptance • Fewer Agencies to co-ordinate • Some experience to date e.g. RWIS • Specific needs to address – rural safety, operations and maintenance, extreme climate • St. John's 25% wireless connection to signals • Autoscope payback in 2 years • Pockets of expertise • Signal pre-emption ready • Can take advantage of lessons learned	• Perception that ITS only applies to urban congestion • No process to focus funding at the provincial or municipal level • Lack of inter-agency coordination • Policies/legislation do not support partnering • Politicians and Public do not fully understand the benefits of ITS • Lack of ITS identity • Demographics, low density	• Lessons learned from others e.g. US rural corridors • Focus on improved safety and incident response • Federal interest is growing, which may be tied to federal funding • Opportunity to demonstrate ITS as an environmental program • Completing wireless communications over 5 years	• Lack of funding • Perceived lack of demand • Lack of awareness of ITS applications • Resistance to change

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEWFOUNDLAND & LABRADOR FOCUS GROUP

User Services: **Public Transport Services**

Strengths	Weaknesses	Opportunities	Threats
• Regional GIS industry skill sets • Various scheduled and charter intercity services • Only one entity for service in St. John's and Mount Pearl • TC GPS pilot project • Large student base • DRL web site • Mile One shuttle service	• Declining ridership • Provincial incentive for expansion is reduced • Lack of interagency/system integration • No link between transit funding and gas taxes • Readily available parking • Low density population • Narrow streets • Poor frequency of service • Poor image of public transit	• Help improve attractiveness of transit option • Smartcard/fare integration expansion • Commitment to Kyoto standard • Opportunities to reduce costs of service delivery • Memorial University partnership • Visibility, Image, Positioning (VIP) program • Rising fuel prices	• Reduced transit funding • Vehicle-centric environment • Increased insurance premiums • Rising fuel prices

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEWFOUNDLAND & LABRADOR FOCUS GROUP

User Services: Electronic Payment Services

Strengths	Weaknesses	Opportunities	Threats
• Existing systems • Strong industry (tolling, Smartcard) • Societal acceptance of electronic tolling • Banking structure within Canada • Revenue application • Small community, easy to integrate with other partners	• Lack of integration amongst required parties (e.g. financial institutions, payment systems, etc.) • Institutional issues • Lack of universally accepted standards • System failures an issue • Potential for too many cards/lack of integration • Lack of regional expertise	• International standard movements (ISO, ASTM) • Commitment to Kyoto standard • Reducing operating costs • Partnering with various related stakeholders e.g. parking, retailers, MUN • Reduce cash handling costs	• Institutional barriers (lack of autonomy) • Public concerns about privacy issues • Lack of natural leader in the community

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEWFOUNDLAND & LABRADOR FOCUS GROUP

User Services: **Commercial Vehicle Operations**

Strengths	Weaknesses	Opportunities	Threats
• International co-operation efforts (NAFTA) • Good regulatory environment • Significant focus on truck safety • Significant intermodal operations • One main highway to focus on	• Lack of funding limiting full implementation • Institutional differences between Canada/US for information sharing • Legislative restrictions • Ability of independent truckers to access programs • Experience with continental programs • No experience with WIM • Small size and low volumes • Carrier HQ outside province	• Expand into courier industry • Provide real time information • Partner with existing fleets • High percentage of commercial vehicles • Expand WIM; reduce drive times • Federal and provincial government interest in gateways and priority corridors • Increased needs for efficient movements at border crossings in light of delays related to security concerns. • Optimization of multi-modal terminals • National CVO programs • Ongoing movement to Electronic Data Interchange • Post schedules for carriers; ferries • Security of Come By Chance Refinery shipments to U.S.	• No buy-in from the user community • Privacy, loss of competitive advantage • Lack of funding

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEWFOUNDLAND & LABRADOR FOCUS GROUP

User Services: **Emergency Management Services**

Strengths	Weaknesses	Opportunities	Threats
• Small number of agencies involved • Existing provincial emergency management organizations • Municipal consolidation, reducing agencies further e.g. Moncton • Well developed telecommunications industry • RCMP-regional coverage • Regional GIS industry strengths • Signals pre-emption ready • Regular coordination meetings with RCMP	• Interagency barriers – information sharing, control at the scene • Minimal focus of emergency agencies on transportation • Lack of agreed-upon incident management procedures • Lack of management of towing industry • Lack of standards for in-vehicle applications e.g. Mayday • No location reference for landline 911 calls • Failed attempt to have one province-wide radio network • Issue: marine users calling 911 instead of using Coast Guard VHF	• Renewed focus on emergency preparedness • Onboard equipment of emergency vehicles (in-vehicle navigation, communications) • Apply commercial fleet management systems to public services • Signal pre-emption programs • Penetration of E911 • Commercial Mayday services	• Lack of available funding

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEWFOUNDLAND & LABRADOR FOCUS GROUP

User Services: **Information Warehousing Services**

Strengths	Weaknesses	Opportunities	Threats
• Existing RWIS programs • Planned national RWIS program	• Lack of traffic data • No incentive to coordinate data • Legislative restrictions regarding Canada/US information sharing in CVO	• Better information from various ITS applications • Work with private fleet information systems to provide accurate real-time information	• Funding • Reduced funding affects quality of data (e.g. collision reporting centres) • Lack of lead agency • Policies for data distribution • Liability for data

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NEWFOUNDLAND & LABRADOR FOCUS GROUP

User Services: Vehicle Safety and Control

Strengths	Weaknesses	Opportunities	Threats
• Adverse environment conditions • One main highway to focus on	• Lack of public infrastructure support • Small market • Public not willing/able to pay	• Early applications for specialty vehicles e.g. snow ploughs, heavy vehicles • Research initiatives	• Legal liabilities • Other countries (Europe, Japan, US) taking lead in product development

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Traveller Information Services

Strengths	Weaknesses	Opportunities	Threats
• Public acceptance & expectations • Strong tourism industry • Telecommunications infrastructure • Use of highway advisory radio	• Lack of interoperability and information sharing • Policies/legislation do not support partnering • Lack of inter-agency co-ordination • Low population density • No central pool of information	• Integration of ferry service schedules • Government programs to encourage travel information distribution for tourism/trade • Lessons learned from others – e.g. TRIP USA • Using/increasing capabilities of commercial products/services • Increased penetration of mobile communications devices • Web-based products • Funding from tourism industry • New services such as 511 • Use of commercial fleet management services to provide traveller information	• Funding • Protection of intellectual property • Inability to form partnerships • Inability to establish business case • Lack of long range planning

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Traffic Management

Strengths	Weaknesses	Opportunities	Threats
• Public acceptance • Fewer Agencies to co-ordinate • Some experience to date e.g. RWIS and SCOOT • Specific needs to address – rural safety, operations and maintenance, extreme climate	• Perception that ITS only applies to urban congestion • No process to focus funding at the provincial or municipal level • Lack of inter-agency coordination • Policies/legislation do not support partnering • Politicians and Public do not fully understand the benefits of ITS • Lack of intra-agency coordination • Lack of infrastructure for HOV	• Lessons learned from others e.g. US rural corridors • Focus on improved safety and incident response • Federal interest is growing, which may be tied to federal funding • Opportunity to demonstrate ITS as an environmental program • Mature ITS industry (not well understood) • Campaign for work zone safety awareness • Tag-equipped vehicles as probes • Ramp metering? • Not using RWIS to full potential	• Lack of funding • Perceived lack of demand • Lack of political coordination • Focus on short term vs. long term goals • Departmental/agency empire building

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: **Public Transport Services**

Strengths	Weaknesses	Opportunities	Threats
• Regional GIS industry skill sets • Various scheduled and charter intercity services • GO Time system • SCOOT signal pre-emption • Transit vehicle MacPass through toll plazas • Web site • Passenger information displays at terminals	• Lack of interagency/system integration • No link between transit funding and gas taxes • No funding from province • Antiquated fare collection and scheduling software • Geographically constrained city centre • Need for low density community services	• Increasing ridership • Help improve attractiveness of transit option • Smartcard/fare integration expansion • Commitment to Kyoto standard • Opportunities to reduce costs of service delivery • Include ferry services in GO Time system • GPS – based GO Time • Multi-mode smart card; partner with cruise ship industry; airports; parking authority • Visibility Image and Positioning (VIP) marketing initiative • Metro transit strategy	• Reduced transit funding • Vehicle-centric environment • Aging buses and facilities • Media reluctance to report on transit operations

- Discussion on role of airport as hub for the region. Atlantic Province Chamber of Commerce – Improve connections and traveller services at airport.

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Electronic Payment Services

Strengths	Weaknesses	Opportunities	Threats
• Existing systems • Strong industry (tolling, Smartcard) • Societal acceptance of electronic tolling • Banking structure within Canada • Revenue application • Toll collection as early adopter • MacPass experience – Fiscal control 60-80% reduction in collection cost – 80-95% MacPass adoption for heavy vehicles – 30% penetration overall	• Lack of integration amongst required parties (e.g. financial institutions, payment systems, etc.) • Institutional issues • Lack of universally accepted standards • Start-up costs • No common clearinghouse • Fear of invasion of privacy	• International standard movements (ISO, ASTM) • Commitment to Kyoto standard • Reducing operating costs • Partnering with various related stakeholders e.g. parking, service stations • Coming US standards • More peripheral uses such as traffic management • Lower cost transponders • OEM installed transponders	• Institutional barriers (lack of autonomy) • Public concerns about privacy issues and abuse of data • Emerging technologies • EFT stored value media • OEM installed transponders

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Commercial Vehicle Operations

Strengths	Weaknesses	Opportunities	Threats
• Experience with continental programs • International co-operation efforts (NAFTA) • Significant focus on truck safety • Significant fleet management technology in place • Regional GIS industry strengths	• Lack of funding limiting full implementation • Institutional differences between Canada/US for information sharing • Legislative restrictions on data exchange • Ability of independent truckers to access programs • Regulatory inconsistency between road/rail/marine/air and international borders, and HAZMAT • Ability of small operators to access technology • Lack of HAZMAT standards – Canada/US/Mexico – No way to track location • Container traffic in downtown	• Expand into courier industry • Provide real time information • Partner with existing fleets • High cross-border traffic demand (NB) • High percentage of commercial vehicles • Expand WIM • Federal and provincial government interest in gateways and priority corridors • Increased needs for efficient movements at border crossings in light of delays related to security concerns. • Optimization of multi-modal terminals • National CVO programs • Ongoing movement to Electronic Data Interchange • Perimeter security at ports	• No buy-in from the user community • Privacy, loss of competitive advantage • Funding • Increased security concerns at border crossings

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Emergency Management Services

Strengths	Weaknesses	Opportunities	Threats
• Small number of agencies involved • Existing provincial emergency management organizations • Municipal consolidation, reducing agencies further e.g. Moncton • Well developed telecommunications industry • RCMP-regional coverage • Regional GIS industry strengths	• Interagency barriers – information sharing, control at the scene • Minimal focus of emergency agencies on transportation • Lack of agreed-upon incident management procedures • Lack of management of towing industry • Lack of standards for in-vehicle applications e.g. Mayday • Decentralized dispatches • Lack of consistency in road naming conventions and signage	• Renewed focus on emergency preparedness • Onboard equipment of emergency vehicles (in-vehicle navigation, communications) • Apply commercial fleet management systems to public services • Signal pre-emption programs • Penetration of E911 • Commercial Mayday services • Renewed interest after 9/11 • 311 for incident reporting	• Lack of available funding • Could be confusing if using common radio frequency

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Information Warehousing Services

Strengths	Weaknesses	Opportunities	Threats
• Existing RWIS programs • Planned national RWIS program • Relatively strong IT sector	• Lack of traffic data • No incentive to coordinate data • Legislative restrictions regarding Canada/US information sharing in CVO • Lack of widely accepted standards	• Better information from various ITS applications • Work with private fleet information systems to provide accurate real-time information • Access to private fleet information • Long term archive • Instrumentation of trucks as probes • Web-based data access methods	• Funding • Reduced funding affects quality of data (e.g. collision reporting centres) • Lack of lead agency • Policies for data distribution • Security of data – e.g. CVO black box reporting

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Vehicle Safety and Control

Strengths	Weaknesses	Opportunities	Threats
• Large market in North America • Automotive manufacturers – ability to influence future designs • Market driven, public willingness to pay • Some carriers have purchased obstacle detection systems and get insurance premium break	• Automotive manufacturing oriented only • Lack of public infrastructure support • Lack of public education to support • Low population density to support infrastructure deployment • Willingness of the consumer to pay?	• Early applications for specialty vehicles e.g. snow ploughs, heavy vehicles • Research initiatives • Vehicle safety marketing tools • Vehicle presence notification "beeper" e.g. airport aprons; emergency vehicles	• Legal liabilities • Other countries (Europe, Japan, US) taking lead in product development • Drivers may become too reliant

User Services: Traveller Information Services

Strengths	Weaknesses	Opportunities	Threats
• Strong tourism industry • GIS database • Excellent opportunity for pilot projects, i.e. microcosm • Road database updated	• Lack of interoperability and information sharing • Policies/legislation do not support partnering • Lack of inter-agency co-ordination • Telecommunications infrastructure • Inaccessibility of GIS data because of high price charged for access • Policy of public sector on IP rights • Small market • Lack of corporate head offices inhibits development of technology • Overhead of public service delivery in Region with small tax base.	• Public acceptance & expectations • Integration of ferry service schedules Northumberland Ferries; new tours announced Quebec-Magdellan-PEI • Travel information distribution for tourism/trade • Lessons learned from others – e.g. TRIP USA • Using/increasing capabilities of commercial products/services • Increased penetration of mobile communications devices • Web-based products • Partnerships to manage access to wireless spectrum and R.O.W. • Lessons learned from other agencies	• Lack of funding • Protection of unwarranted intellectual property* • Inability to form partnerships • Inability to establish business case • Existing little start-ups/service providers can get squeezed out • Telecoms policy to own or block, i.e. can be technology inhibitor as they become vertically integrated content and service provider

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Traffic Management

Strengths	Weaknesses	Opportunities	Threats
• Public acceptance • Fewer Agencies to co-ordinate • Mature ITS industry • Good ITS mentality within agencies • Some experience to date e.g. RWIS • Specific needs to address – rural safety, operations and maintenance, extreme climate • Existing RWIS data map on web site • 42 vehicle classification sites • Permanent counting station using IR detection • Resources/references available, e.g. Confederation Bridge TMS, Halifax SCOOT • Open to pilot programs • GIS-T • Signal coordination on perimeter by-pass	• Perception that ITS only applies to urban congestion • No process to focus funding at the provincial or municipal level • Lack of inter-agency coordination • Policies/legislation do not support partnering • Politicians and Public do not fully understand the benefits of ITS • Lack of public awareness • Lack of inter-departmental coordination	• Lessons learned from others e.g. US rural corridors • Focus on improved safety and incident response • Federal interest is growing, which may be tied to federal funding • Opportunity to demonstrate ITS, e.g. Confederation Bridge • RWIS – Province has stations and Bridge has monitoring and dedicated forecasts. Participation national RWIS panel • Opportunities to link collision data and images to GIS-T	• Lack of funding • Perceived lack of traffic demand • People have expectations of no delay, i.e. low tolerance for unscheduled events

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Public Transport Services

Strengths	Weaknesses	Opportunities	Threats
• Regional GIS industry skill sets • Various scheduled and charter intercity services • Catering to seniors market in Charlottetown	• Provincial incentive for expansion is reduced • Lack of interagency/system integration • No link between transit funding and gas taxes • Frustration over scheduled service limitation in Charlottetown • Lack of reliability and appropriate schedules as controlled by government • Focus on seniors vs. broader population	• Help improve attractiveness of transit option • Smartcard/fare integration expansion • Commitment to Kyoto standard • Opportunities to reduce costs of service delivery e.g. use school vehicles off-peak for other services • Need student transport services	• Reduced transit funding • Vehicle-centric environment • Reduced tourism demand if not reliable intercity transit

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Electronic Payment Services

Strengths	Weaknesses	Opportunities	Threats
• Existing systems • Strong industry (tolling, Smartcard) • Revenue application • Commercial carrier acceptance	• Lack of integration amongst required parties (e.g. financial institutions, payment systems, etc.) • Institutional issues • Lack of universally accepted standards • Banking structure does not allow change to front end systems • POS front end is unique to each bank • Set-up of debit account can be a barrier for small operators • Privacy issues	• International standard movements (ISO, ASTM) • Reducing operating costs • Partnering with various related stakeholders e.g. parking, retailers • Common back-office would reduce everyone's cost • New technology applications – Proximity readers • Opportunities for rewards programs	• Institutional barriers (lack of autonomy) • Public concerns about privacy issues • High start-up costs • Technology obsolescence • Opportunities for hidden transaction fees or taxes

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Commercial Vehicle Operations

Strengths	Weaknesses	Opportunities	Threats
• Experience with continental programs • International co-operation efforts (NAFTA) • Good regulatory environment • Significant fleet management technology in place • Regional GIS industry strengths • WIM experience	• Lack of funding limiting full implementation • Institutional differences between Canada/US for information sharing • Legislative restrictions on data exchange • Ability of independent truckers to access programs • Truck safety inspection not uniform across provinces, i.e. need to harmonize standards • Concerns over ability of schools to supply drivers	• Expand into courier industry • Provide real time information • Partner with existing fleets • High cross-border traffic demand (NB) • High percentage of commercial vehicles • Expand WIM • Federal and provincial government interest in gateways and priority corridors • Increased needs for efficient movements at border crossings in light of delays related to security concerns. • Optimization of multi-modal terminals • National CVO programs • Ongoing movement to Electronic Data Interchange • Integration of ferry system	• No buy-in from the user community • Privacy, loss of competitive advantage • Funding • Increased security concerns at border crossings

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Emergency Management Services

Strengths	Weaknesses	Opportunities	Threats
• Small number of agencies involved • Existing provincial emergency management organizations • Municipal consolidation, reducing agencies further e.g. Moncton • Well developed telecommunications industry • RCMP-regional coverage • Regional GIS industry strengths • Common GIS for Island	• Interagency barriers – information sharing, control at the scene • Minimal focus of emergency agencies on transportation • Lack of agreed-upon incident management procedures • Lack of management of towing industry • Lack of standards for in-vehicle applications e.g. Mayday • Inability to communicate between agencies, e.g. – RCMP – ambulance services cannot communicate en-route in some cases • RCMP cruisers cannot communicate inter-provincially – different radio systems	• Renewed focus on emergency preparedness • Onboard equipment of emergency vehicles (in-vehicle navigation, communications) • Apply commercial fleet management systems to public services • Signal pre-emption programs • Penetration of E911 • Commercial Mayday services	• Lack of available funding • Implementation of measures in response to 9/11 without adequate planning

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Information Warehousing Services

Strengths	Weaknesses	Opportunities	Threats
• Existing RWIS programs • Planned national RWIS program	• Lack of traffic and road network data • No incentive to coordinate data • Legislative restrictions regarding Canada/US information sharing in CVO • Lack of skill sets to analyze data • Lack of policies for use of data	• Better information from various ITS applications • Work with private fleet information systems to provide accurate real-time information	• Funding • Reduced funding affects quality of data (e.g. collision reporting centres) • Lack of lead agency • Policies for data distribution

ATLANTIC ITS STRATEGIC PLAN – STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT) ANALYSIS
NOVA SCOTIA FOCUS GROUP

User Services: Vehicle Safety and Control

Strengths	Weaknesses	Opportunities	Threats
• Large market • Automotive manufacturers – ability to influence future designs • Market driven, public willingness to pay	• Automotive manufacturing oriented only • Lack of public infrastructure support	• Early applications for specialty vehicles e.g. snow ploughs, heavy vehicles • Research initiatives	• Legal liabilities • Other countries (Europe, Japan, US) taking lead in product development

APPENDIX D

USER SERVICE ANALYSIS

Appendix D – Use Service Analysis

Each candidate user service has been analyzed against a set of criteria in consultation with the stakeholder community. The user service analysis criteria are an aggregation and elaboration of those established in previous ITS strategic planning studies in Canada and abroad. A brief description of these criteria is provided as follows:

- **Ability to Address Need** – Does a widely recognized need currently exist and can the facilities/services included in the user service be deployed to address these priorities?
- **Compatibility with Vision** – Does the user service correspond with the fundamentals of the Atlantic Provinces ITS Vision as outlined in Section 3.0?
- **Potential Benefit** – Which of the user services will be of the most benefit in terms of magnitude, payback period, and potential beneficiaries?
- **Practicality** – Can the user service be ready in the time and are potential users and beneficiaries positioned to make use of the service?
- **Availability of Champion(s)** – Are there individuals, groups or agencies willing to spearhead the planning/implementation to move the initiative along?
- **Risk Management** – Are there risks involved and can they be overcome and managed in the implementation time frame?
- **Capability of Integration** – Can the ITS service be easily integrated into mainstream transportation and management activities within the Atlantic Provinces? Can the user service be integrated across modes, jurisdictions and geographic areas?

A set of "User Service Assessment" summaries are included on the following pages for the higher priority/ more relevant user services. A review of the user service assessments yields the following observations:

- Most of the user services are characterized by a high degree of compatibility with the vision and the stated needs, stemming from a readily identifiable and proven set of benefits.
- Most of the user services under consideration employ proven applications and hence can be considered practical for implementation in the Atlantic Region. However, some user services, such as Automated Warning and Enforcement are characterized by significant implementation hurdles to overcome, such as legislative changes, and are considered less practical for near term implementation.
- Many of the user services, such as Traveller Services and Reservations, involve a broad range of stakeholders on a region-wide scale. This presents challenges in terms of identifying appropriate champions to secure funding and lead a deployment and operations effort.
- Virtually all of the user services under consideration offer some level of capability to integrate and exchange information with other companion user services. In many cases, enabling standards to support this integration exist or are under development.

ITS USER SERVICE: 1.1 Traveller Information

The Traveller Information user service provides travellers with information prior to their departure to assist them in making mode choices, travel time estimates, and route decisions. The sub-services of the Traveller Information user service address four major functions, which are: (1) Available Services Information, (2) Current Situation Information, (3) Trip Planning Service, and (4) User Access. Information is integrated from various transportation modes and other information sources and is presented to the user for decision making.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	Address needs associated with ferry operations/service, provision of road condition information and the tourism growth/information.	●
Compatibility with Vision	Support the safety, efficiency and improved service provision of the vision.	●
Potential Benefit	Generate tourism interest and permit the trip planning functions Reduce collisions through the early notification/dissemination of adverse conditions Provide improved service provision for ferry and parking operations	●
Practicality	The implementation of traveller information services can be undertaken in the short term, given the availability of supporting data, information and web services at the provincial and municipal levels	●
Availability of Champion(s)	Road authorities, tourism agencies and ferry operators.	○
Risk Management	Too many stakeholders providing information. May lead to overlap and contradiction.	◐
Capability for Integration	PEI, NB, NFLD, NS have existing telephone and/or web based information systems relating to road conditions and travel opportunities.	◐

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

ITS USER SERVICE: 1.4 Traveller Services and Reservations

The Traveller Services Information user service provides the traveller with access to "yellow pages" type information regarding a variety of travel-related services and facilities. The information will be accessible to the traveller in the home or office to support pre-trip planning and while enroute, either in the vehicle or at public facilities such as public transit terminals or highway rest stops.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	The capability to monitor facility utilization/operations and provide information to potential users will increase tourist interest in the Atlantic Provinces and will improve the ferry and parking operations.	●
Compatibility with Vision	Supports the vision in improving economy through increase in tourism activity and assisting agencies/operators in the management of their existing resources/operations.	●
Potential Benefit	Improved information dissemination to ferry users Efficient use of existing parking facilities Increase tourism expenditures	●
Practicality	Systems to support this user service can be established in the short term.	●
Availability of Champion(s)	Parking authorities/operators, tourism agencies and ferry operators.	○
Risk Management	Lack of funding and the ability to build a solid business case to attract private/tourism funding and consider cost sharing	○
Capability for Integration	Integration opportunities with existing public web-based information services and with traveller information services.	◐

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

User Services 1.4 and 1.1 should be pursued together.

ITS USER SERVICE: 2.1 Traffic Control

The Traffic Control user service manages the movement of traffic on streets and highways. It includes surface street controls such as traffic signal systems, adaptive traffic control systems and freeway control techniques such as ramp metering and lane control. Between the eight sub-services of the Traffic Control user services, the following four functions are provided which are (1) Traffic Flow Optimization, (2) Traffic Surveillance, (3) Control Function, and (4) Provide Information.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	ITS traffic control technologies have been proven to address operations and safety.	●
Compatibility with Vision	Supports the operation efficiency and safety goals of the vision.	◐
Potential Benefit	Reduced delay and congestion Improved safety. Improved monitoring and traffic data collection abilities	●
Practicality	Traffic control technologies are readily available.	●
Availability of Champion(s)	Municipalities take the lead.	●
Risk Management	Interagency coordination. Ability to secure funding.	◐
Capability for Integration	Opportunities exist to integrate new systems/technologies with existing traffic control systems.	●

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

ITS USER SERVICE: 2.2 Incident Management

The Incident Management user service enhances existing capabilities to identify incidents, formulate response actions, and support initiation and ongoing co-ordination of those response actions. The single sub-service of the Incident Management user service provides six major functions such as: (1) Scheduled Planned Incidents, (2) Identify Incidents, (3) Formulate Response Actions, (4) Support Co-ordinated Implementation of Response Actions, (5) Support Initialization of Response to Actions, and (6) Predict Hazardous Conditions.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	Incident management systems have been proven to reduce incident detection, confirmation and response times.	◐
Compatibility with Vision	Supports increased efficiency and collision reduction objectives.	◐
Potential Benefit	Reduce cost of congestion resulting from emergency and non-emergency incidents Reduce severity of collisions and potential for secondary collisions Increase capacity of existing infrastructure	◐
Practicality	Proven applications.	●
Availability of Champion(s)	All government agencies have a mandate to manage their own infrastructure.	◐
Risk Management	Lack of Funding In some cases, existing intra-jurisdiction and agency communications are poor/not available. Lack of wireless communications in rural areas.	○
Capability for Integration	Incident management could be integrated into existing traffic control centres.	●

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

ITS USER SERVICE: 2.4 Environmental Conditions Monitoring

The Environmental Conditions and Monitoring user service provides government agencies with the capability to enhance their air quality control strategies. The function provides both wide area and Wayside emissions monitoring as well as Road Weather Systems and Services. Information is used by Traffic Demand Management in the Traffic Management Centre to mitigate pollution and may be provided to enforcement agencies to compel offenders to comply with standards. In addition, road weather information and forecasts provide inputs to other systems such as ATMS and ATIS to increase safety and efficiency.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	The advance notice of environmental hazards such as fog, freezing rain and heavy snowfalls can be accomplished through the use of environmental monitoring equipment and associated information dissemination abilities.	●
Compatibility with Vision	Improve safety of the traveling public and commercial vehicles.	●
Potential Benefit	Increase ability to provide advance warning of hazardous roadway conditions Timely deployment of maintenance equipment.	●
Practicality	It may be less practical to provide environmental monitoring on low volume roadways.	●
Availability of Champion(s)	Provinces have initiated/established environmental conditions monitoring programs.	●
Risk Management	From a funding perspective, coverage in rural areas may be difficult to justify given lower traffic volumes.	●
Capability for Integration	Integration into existing RWIS sites/programs. Integration with traveller information and operations and maintenance user services.	●

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

ITS USER SERVICE: 2.5 Operations and Maintenance

The Operations and Maintenance user service provides government agencies, as well as contractors with the resources to manage the operations and maintenance of vehicle fleet and equipment assets, and monitor and manage traffic flow around work zone areas.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	Provide more cost-effective management of facilities.	◐
Compatibility with Vision	Improve safety of the traveling public and commercial vehicles.	◐
Potential Benefit	Reduce operating expenditures by maintenance departments. Provide improved road maintenance activities.	◐
Practicality	Proven applications.	●
Availability of Champion(s)	Each infrastructure operator.	●
Risk Management	Operational transition to new technologies is challenging. Upfront funding requirements are substantial and must be justified versus other municipal needs.	○
Capability for Integration	Opportunities to share with adjacent. Integration with traveller information and operations and maintenance user services.	◐

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

ITS USER SERVICE: 2.6 Automated Warning and Enforcement

The Automated Dynamic Warning and Enforcement user service provides systems which warn vehicles or motorists of imminent danger, and provide electronic enforcement of traffic control and regulations.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	Maybe for specific locations? Need some help here? Clearly recognized in industry.	●
Compatibility with Vision	Supports safety goals of the vision.	●
Potential Benefit	Reduction in frequency and severity of collisions.	●
Practicality	High start-up costs for a low population base. Legislative changes required.	○
Availability of Champion(s)	Municipalities.	●
Risk Management	Low traffic volumes on some rural roadways may make it difficult to justify expenditures.	○
Capability for Integration	Autonomous capabilities support remote applications.	◐

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

ITS USER SERVICE: 3.1 Public Transport Management

The Public Transport Management user service applies advanced vehicle electronic systems to various public transportation modes and uses the data generated by these modes to improve service to the public. It includes operation of vehicles and facilities, planning and scheduling, and personnel management.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	Public transport ITS services have permitted transit operators to better manage their assets and to provide real-time information at key locations in their system	●
Compatibility with Vision	Supports efficiency and traveller quality of service goals included in the vision.	●
Potential Benefit	Improve transportation service to the public Increase efficiency and optimize use of existing assets	●
Practicality	Mature GPS industry. Communications and information dissemination technologies readily available.	●
Availability of Champion(s)	Existing transit operations are present in most major centres.	●
Risk Management	Substantial upfront funding requirements. Operational transition to new technologies/systems is challenging.	●
Capability for Integration	Tie into other information sources.	●

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

ITS USER SERVICE: 4.1 Electronic Payment Systems

The Electronic Payment Services user service allows travellers to pay for transportation services by electronic means. Between the four sub-services of the Electronic Payment user services the following functionality is provided: (1) Electronic Toll Collection, (2) Electronic Fare Collection, (3) Electronic Parking Payment, and (4) Electronic Payment Services Integration. It may, as envisioned, also serve broad non-transportation functions and may be integrated with credit and debit cards in banking and other financial transactions.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	Provides efficiency in ticketing and payment of fares. Assesses demand compared to capacity through tracking of parked vehicles or transit riders, which in turn provides opportunities to accommodate excessive demands through signing for supplemental parking or additional buses.	●
Compatibility with Vision	Minimizes delays and congestion resulting form capacity problems. Manages travel demand by providing parking availability information or additional buses as required.	●
Potential Benefit	Improves throughput into/out of parking venues, reducing delays, improves speed of boarding transit, reduces demands for personnel at monetary collection points	●
Practicality	Requires upgrade of equipment to collect fees and distribution of Smart Cards. Can be achieved for pilot projects initially and expanded to larger catchment areas subsequently.	●
Availability of Champion(s)	Pilot project could be launched by a single transit operator or commuter-parking venue. The initiator of a project of this type can anticipate operational efficiencies.	●
Risk Management	There is some onus on the public to change their normal approach to paying for parking or transit, that may be frustrating initially	◐
Capability for Integration	Parking and transit rider information can be used internally by proponent for analysis purposes that may lead to improvements and increased efficiencies to business. Personal information could be used in many ways, if deemed acceptable.	◐

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

The use of electronic payment is a rapidly increasing area of growth internationally and many projects have reported successes through the implementation of these technologies.

ITS USER SERVICES: 5.1 Commercial Vehicle Electronic Clearance

The Commercial Vehicle Electronic Clearance user service consists of both domestic and international border electronic clearances. Domestic electronic clearance allows commercial vehicles to continue past inspection stations without stopping. International border clearance allows vehicles to bypass international border checkpoints without stopping, or at least with expedited checks. As a vehicle approaches an inspection station or checkpoint, vehicle to Wayside communications take place that identify the vehicle and make available to authorities the necessary data about credentials, vehicle weight, safety status, cargo, and occupants. Enforcement personnel can then select potentially unsafe vehicles for inspection and allow safe and legal vehicles to bypass the inspection station/checkpoint.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	Border crossings have become of critical importance to economic trade between Canada and the US. Use of electronic clearance technologies will improve flow.	●
Compatibility with Vision	Minimizes delays and congestion at border crossings and at weigh points on the highway system. It improves data collection, management and sharing to assist agencies to manage their operations.	●
Potential Benefit	By improving the flow of traffic and in particular trucks, economic trade increases viability, fuel costs are reduced, emissions are reduced and staff requirements at borders/ weigh stations are reduced.	●
Practicality	Due to recent interest from a national security perspective, all levels of government, the business community including carriers and the general public all support the use of technologies to ease delays and improve national security.	●
Availability of Champion(s)	For WIM stations, a provincial DOT would be involved and may initiate a private venture to transfer responsibility. For border crossings, the federal government has recently made budget available to initiate introduction of new technologies.	◐
Risk Management	Use of new technologies for these applications is becoming a standard approach and is endorsed by the Federal Governments of Canada and the US. Carriers must buy in to the use of new equipment.	●
Capability for Integration	Required information for border clearance or vehicle loads can be used by several different agencies since there are issues of customs, immigration, safety, agriculture/food/drug and environmental regulations that must be covered off. One-stop portal for credentialing, WIM and automated safety inspection systems (Advantage I-75) could use the same equipment.	◐

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

Timing for introduction of new technologies at border crossings is very much in the immediate term. Financial support by the Federal Government will likely be in place for application to new technologies.

ITS USER SERVICE: 5.5 Intermodal Freight Management

The Intermodal Freight Management user service provides systems which will monitor the status of freight in-transit and at freight terminals.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	To remain competitive/efficient carriers and operating agencies will need to seek out ways of expediting Intermodal transfers and clearances. Use of electronic clearance technologies and freight monitoring/tracking systems will improve flow through these critical links	●
Compatibility with Vision	Supports the efficiency goals of the vision.	●
Potential Benefit	Minimizes delays associated with the access to and within Intermodal terminals. Agencies and private companies will have the ability to better monitor their operations and thus improve efficiency.	●
Practicality	Due to recent interest from a national security perspective, all levels of government, the business community including carriers and the general public all support the use of technologies to ease delays and improve national security.	●
Availability of Champion(s)	Intermodal terminal operators, port authorities and carriers.	◐
Risk Management	Carriers must buy in to the use of new equipment and to the fact that increased monitoring does not translate into increased regulations/delays.	◐
Capability for Integration	A challenge will be the transfer from the existing system and practices to the newer technologies, all while maintaining existing or better levels of service in the facilities.	◐

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

ITS USER SERVICE: 5.6 Commercial Fleet Management

The Commercial Fleet Management user service provides real-time communications for vehicle location, dispatching and tracking between commercial vehicle drivers, dispatchers, and intermodal transportation providers, thereby reducing delays for drivers and providing commercial drivers and dispatchers with real-time routing information in response to congestion or incidents. Commercial fleet management includes the management of taxi fleets.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	To remain competitive and efficient, new GPS technologies can be used to provide better reliability, convenient delivery timing, improved delivery turn-around.	●
Compatibility with Vision	Fleet management can reduce delay costs and boost economic activity. It can also help delivery and recipient operations better manage operations.	●
Potential Benefit	Introduction of fleet management will provide integration with the North Eastern US, improve uniformity of truck safety inspection, allows tracking of vehicles throughout the Canada-US-Mexico corridor and provide perimeter security at ports.	●
Practicality	There is current interest in fleet management since there is significant fleet management in place in NB and NS and an established community of carriers that will be proactive. There is also an ongoing movement to electronic data interchange.	●
Availability of Champion(s)	With the growing interest in this area within the trucking community, there is likely to be interest to lead in this area and to integrate with US and other Canadian provincial fleet management opportunities.	●
Risk Management	Although CVO can provide benefits, there are concerns about retaining efficiencies at the US border. There are also issues related to the size of truck fleets in PEI and Newfoundland, the latter of which has headquarters for trucking organizations out of province.	●
Capability for Integration	There do not appear to be major obstacles to integration however some provinces are further ahead in the use of the technologies currently. Data from CVO could be used in other ways and integration of data management with other agencies is achievable.	●

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

A strategy can be readily developed to build on current use of CVO, available technologies and coverage by available wireless communications and expanded to suit growing requirements and growing interest from the other provinces.

ITS USER SERVICE: 6.1 Emergency Notification and Personal Security

The Emergency Notification And Personal Security user service provides the capability for the user to manually initiate a distress signal for incidents like mechanical breakdown or non-injury collisions. An automated system would help mitigate the consequences of a serious collision by automatically sending information regarding the location, nature and severity of the collision to an emergency services dispatcher and/or to hospital and emergency room personnel.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	The use of wireless communications technologies to alert agencies of emergency conditions is important. The use of ITS for personal well being is of critical interest to the local communities.	●
Compatibility with Vision	The opportunity to improve safety for the travelling public and to provide fast and coordinated responses to incidents and other emergencies are important goals within the vision.	●
Potential Benefit	The ability to respond to emergencies quickly with the appropriate responses is a major benefit of ITS and specifically EMS. This improvement in responsiveness can improve chances of a positive outcome to the emergency and reduce overall impacts.	●
Practicality	At present there are issues of inconsistent wireless spectrums among emergency service agencies. There is however growing consolidation of emergency services within each province. The use of separate dispatches for emergency services is also an issue.	◐
Availability of Champion(s)	There are several agencies in each province providing services. Some of the communities have consolidation amongst agencies. The identification of a champion is not currently apparent.	○
Risk Management	The requirement to coordinate among several agencies and jurisdictions to provide suitable response opens the potential for inappropriate response and confusion, which may have an increased impact to the emergency.	○
Capability for Integration	The use of communications networking, the coordination between agency dispatches and other aspects of a management system will likely have many integration opportunities beyond the essential needs of notification and security.	●

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

Inter-agency coordination is a challenging goal and the benefits of achieving it are important enough to attempt this on a Provincial or Regional basis.

ITS USER SERVICES: 6.3 Disaster Response and Management

The Disaster Response and Management user service co-ordinates disaster response strategies from a virtual control centre, and disseminates information to agencies and individuals on traffic conditions, diversion routes etc.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	The ability to respond to infrequent major transportation emergency events in which significant impact has/will occur is a critical need and a coordinated response including information dissemination is required as responses.	●
Compatibility with Vision	Improving safety for the traveling public and commercial vehicles together with minimizing delays and congestion, managing travel demand and providing fast and coordinated responses to incident and other emergencies should be pursued.	●
Potential Benefit	Any opportunity to reduce the magnitude of a disaster through appropriate means will likely result in limited impacts and more efficient use of emergency service resources.	●
Practicality	Providing a suitable disaster response often requires coordinating with special emergency services if available in addition to local emergency services which therefore makes the coordination more challenging to build up.	○
Availability of Champion(s)	There are several agencies in each province providing services. Some of the communities have consolidation amongst agencies. The identification of a champion is not currently apparent.	○
Risk Management	The requirement to coordinate among several agencies and jurisdictions to provide suitable response opens the potential for inappropriate response and confusion, which may have an increased impact to the emergency.	○
Capability for Integration	The use of communications networking, the coordination between agency dispatches and other aspects of a management system will likely have many integration opportunities beyond the essential needs of notification and security.	●

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

Coordination of special emergency service agencies together with local service agencies is a challenging goal however the benefits of achieving it are important enough to attempt this on a Provincial or Regional basis.

ITS USER SERVICE: 6.4 Emergency Vehicle Management

The Emergency Vehicle Management Service user service is oriented towards reducing the time from the receipt of notification of an incident by an emergency services dispatcher, and the arrival of emergency vehicles on the scene. It includes emergency vehicle fleet management, route guidance to the incident scene or a suitable hospital, and pre-emption of traffic signals on an emergency vehicle's route to receive more green displays.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	The use of wireless communications technologies to enable a management strategy to address situations appropriately is important. The use of ITS where personal well being is involved is of critical interest to the local communities.	
Compatibility with Vision	The opportunity to improve safety for the travelling public and to provide fast and coordinated responses to incidents and other emergencies are important goals within the vision.	
Potential Benefit	The ability to respond to emergencies quickly with the appropriate responses is a major benefit of ITS and specifically EMS. This improvement in responsiveness can improve chances of a positive outcome to the emergency and reduce overall impacts. It can also improve the use of the available emergency service resources.	
Practicality	At present there are issues of inconsistent wireless spectrums among emergency service agencies. There is however growing consolidation of emergency services within each province. The use of separate dispatches for emergency services is also an issue.	
Availability of Champion(s)	There are several agencies in each province providing services. Some of the communities have consolidation amongst agencies. The identification of a champion is not currently apparent.	
Risk Management	The requirement to coordinate among several agencies and jurisdictions to provide suitable response opens the potential for inappropriate response and confusion, which may have an increased impact to the emergency.	
Capability for Integration	The use of communications networking, the coordination between agency dispatches and other aspects of a management system will likely have many integration opportunities beyond the essential needs of notification and security.	

Inter-agency coordination is a challenging goal and the benefits of achieving it are important enough to attempt this on a Provincial or Regional basis.

ITS USER SERVICE: 8.1 Weather and Environmental Data Management

The Weather and Environmental Data Management user service provides system wide gathering, fusion, and dissemination of information on roadway weather conditions and forecasts.

CRITERION	ASSESSMENT	RATING
Ability to Address Need	As a key component of an RWIS service, information must be assembled and analysed to provide meaningful output as road reports and instructions to road maintenance vehicles/patrols.	●
Compatibility with Vision	As a means of improving data collection, management and sharing, Information Warehousing is an important component.	●
Potential Benefit	The ability to manipulate data provides users with relevant and timely information, which in turn assists agencies in better managing their operations and infrastructure.	●
Practicality	The warehousing aspect of this service requires allowing several data nodes to communicate in real time. Aspects of communications architecture must be considered in this assessment. At present this potential is expected to be weak.	○
Availability of Champion(s)	There would be incentive for road winter maintenance operators to initiate IW to permit the use of RWIS which in turn assists their operations to be more effective and efficient in terms of resources.	○
Risk Management	RWIS is a standard approach to road winter maintenance that relies on IW and does not represent onerous use of technology or agency interaction.	◐
Capability for Integration	IW is a most appropriate source of data for many applications that relate to road operations. Data relating to road conditions and weather conditions can be used to provide forecasts for future use and collision analyses to assess patterns in maintenance activity.	●

LEGEND

High ● **Medium** ◐ **Low** ○

GENERAL COMMENTS

Communications between field sample stations and data nodes is required, as are communications links between data nodes to support data transfers in real time.

APPENDIX E

EARLY WINNERS ASSESSMENT

Appendix E – Early Winner Assessments

One means of examining the merits of a given user service is to assess the validity of an early winner, or pilot project undertaking. Such undertakings can serve as a microcosm of a broader deployment, and test the abilities to bring together project partners in resolving barriers to implementation, and demonstrate the effectiveness of the application. The user service focus groups held in each Atlantic Province included an activity where participants were invited to develop strategies, focusing on "early winner" projects that could be implemented fairly quickly and easily, and promote ITS implementation.

The following is a summary of the criteria for which the participants were asked to address for each early winner project:

- **Meets perceived need** – The project meets a perceived need and addresses a higher priority issue;
- **Consensus support** – The initiative has received a level of consensus among stakeholders that it is a worthwhile project to pursue;
- **Minimal technological barriers** – Has a low risk of being held-up or defeated by a technological barrier;
- **Minimal institutional barriers** – Has a low risk of being held-up or defeated by a institutional barrier;
- **Business case** – Can be implemented at a reasonable cost and provide obvious and real benefits to a large stakeholder group;
- **Attracts champions** – Will catch the attention of potential champions among legislators, business leaders, the public and the media; and
- **Contributes to ITS profile/Vital to mainline strategy** – Showcases ITS as a viable component of the mainline transportation strategy.

Table 1 is a summary of the potential early winner projects identified by the participants. Appendix C includes summary sheets, which assess each candidate project against the stated criteria.

The identified early winner projects provide a solid starting point for implementation planning, and these projects are carried forward for further analysis under subsequent steps of the project.

Table 1 – Candidate "Early Winner" Projects

Project Name	Province
Incident Management	New Brunswick
Electronic Payment	New Brunswick
Commercial Vehicle Administrative Process	New Brunswick
Province-wide Weigh-In-Motion Program	Newfoundland and Labrador
Interactive Traveller Information	Newfoundland and Labrador
Red Light Camera Pilot Project	Newfoundland and Labrador
Implementation of Transportation Smart Card	Newfoundland and Labrador
Signal Pre-Emption for Priority Areas	Newfoundland and Labrador
Traffic Responsive Signal System	Newfoundland and Labrador
En-Route Transit Information	Nova Scotia
Public Travel Security	Nova Scotia
Transit Traffic Light Pre-Emption/Priority	Nova Scotia
Consolidation of "Just-in-time" Information Gathering and Dissemination for all Modes of Transportation	Nova Scotia
Initiate Intermodal Network	Nova Scotia
Electronic Payment	Nova Scotia
Centralized Traveller Information System	Nova Scotia
Public Transport Services – Optimize Fleet GPS	Prince Edward Island
Incident Management	Prince Edward Island
Environmental Conditions Monitoring	Prince Edward Island
Adaptive Traffic Signal System	Prince Edward Island
Emergency Vehicle Management	Prince Edward Island
Electronic Payment Services	Prince Edward Island
Demand Responsive Transit	Prince Edward Island
Traveller Information System	Prince Edward Island

"Early Winner" Assessment – NB Focus Group

Project Description Incident Management – Implement a plan to develop/enhance a system to coordinate response to events. This would include elements to identify and locate incidents and coordinate response (RCMP, ambulance, tow trucks).	**Champion(s)** • Provincial (DPS/DOT) • Federal (RCMP) • Municipal

Criteria	Comments	Rating 1	2	3	4	5
Meets perceived need	• Meet – very proactive approach.	☐	☐	☐	☐	☑
Consensus support	• Yes – agreed that timely response saves lives.	☐	☐	☐	☐	☑
Minimal technological barriers	• Proven technology (COMPASS).	☐	☐	☐	☐	☑
Minimal institutional barriers	• Requires high degree of cooperation.	☐	☐	☐	☑	☐
Business case	• Yes – life saving and cost – proper response effort.	☐	☐	☐	☑	☐
Attracts champions	• Yes – benefits and quickly achieved – attracts attention.	☐	☐	☐	☐	☑
Contributes to ITS profile	• Yes – Builds upon other success (COMPASS)	☐	☐	☐	☐	☑
Vital to mainline strategy	• Clients toward fast/timely service – fulfills public expectations.	☐	☐	☐	☐	☑
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – NB Focus Group

Project Description	**Champion(s)**
Electronic Payment – Expand transponders to be used in other areas that toll collection (i.e. parking, gas).	• Toll Facilities • Municipalities • Private Sector.

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Toll collection is in place now and working well.	☐	☐	☐	☐	☑
Consensus support	• NB and WS have agreement now, PEI considering.	☐	☐	☐	☑	☐
Minimal technological barriers	• No technical problems.	☐	☐	☐	☑	☐
Minimal institutional barriers	• You have to deal with backroom issues.	☐	☑	☐	☐	☐
Business case	• Cost and timesavings to user and provider.	☐	☐	☐	☑	☐
Attracts champions	• Halifax/Dartmouth, Cobeqard Pass and St. John National Bridge.	☐	☐	☐	☑	☐
Contributes to ITS profile	• Highly visible.	☐	☐	☐	☐	☑
Vital to mainline strategy	• Overcome institutional barriers and convincing end users its available system.	☐	☐	☑	☐	☐
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – NB Focus Group						
Project Description Commercial Vehicle Administrative Process		**Champion(s)** Public Safety				
Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Yes	☐	☐	☐	☐	☑
Consensus support	• Industry – yes. • Inter-provincial – yes.	☐	☐	☐	☐	☑
Minimal technological barriers	• Base exists currently.	☐	☐	☐	☐	☑
Minimal institutional barriers	• High – cooperation between OVTS.	☐	☐	☐	☑	☐
Business case	• Significant but medium-high start-up costs.	☐	☐	☑	☐	☐
Attracts champions	• Existing successes in North America. • Addresses high priority need.	☐	☐	☐	☑	☐
Contributes to ITS profile	• Yes.	☐	☐	☐	☐	☑
Vital to mainline strategy	• Absolutely.	☐	☐	☐	☐	☑
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – NF Focus Group						
Project Description Province-wide WIM program		**Champion(s)** Trucking Industry CME				
Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Existing requirements	☐	☐	☐	☐	☑
Consensus support	• Carriers are supportive • Requires seed money from government	☐	☐	☐	☑	☐
Minimal technological barriers	• Proven technology	☐	☐	☐	☐	☑
Minimal institutional barriers	• Funding • Awareness campaign	☐	☐	☐	☑	☐
Business case	• Hours of service requirements could reduce trip from 2 days to 1 day by saving 1 hour of drive time	☐	☐	☐	☐	☑
Attracts champions	• Trucking community	☐	☐	☐	☐	☑
Contributes to ITS profile	• High profile and visibility to public	☐	☐	☐	☑	☐
Vital to mainline strategy	• Contributes to all factors	☐	☐	☐	☐	☑
Overall Probability of Success as "Early Winner"		☐	☐	☐	☐	☑

"Early Winner" Assessment – NF Focus Group

Project Description	**Champion(s)**
Interactive Traveller Information – provide road conditions, traffic, weather via wireless network Priority areas: Argentia and Port Aux Basques	• Transportation, Federal & Provincial Government • Tourism • Carrier (wireless-telecom)

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Road conditions, amenities, tourism – attractions	☐	☐	☐	☑	☐
Consensus support	• Currently available in other media – radio, TV • Proven to work	☐	☐	☐	☐	☑
Minimal technological barriers	• Existing infrastructure – Cellular, internet – Wide area is larger problem	☐	☐	☑	☐	☐
Minimal institutional barriers	• Inter-Governmental coordination required	☐	☐	☐	☐	☐
Business case	• Initial capital outlay • Revenue potential?	☐	☐	☐	☑	☐
Attracts champions	• Yes – Business potential	☐	☐	☐	☑	☐
Contributes to ITS profile	• Yes – High profile	☐	☐	☐	☑	☐
Vital to mainline strategy	• Enhances safety • Promotes regional economics	☐	☐	☐	☑	☐
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – NF Focus Group

Project Description	**Champion(s)**
Red Light Camera Pilot Project	City of St. John's

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Reduced collisions	☐	☐	☐	☐	☑
Consensus support		☐	☐	☐	☐	☑
Minimal technological barriers	• Proven technology	☐	☐	☐	☐	☑
Minimal institutional barriers	• Legislative changes	☑	☐	☐	☐	☐
Business case	• Significant cost benefit • Self funding	☐	☐	☐	☐	☑
Attracts champions		☐	☐	☐	☐	☑
Contributes to ITS profile	• Improves safety • Public visibility	☐	☐	☐	☐	☑
Vital to mainline strategy		☐	☐	☑	☐	☐
Overall Probability of Success as "Early Winner"		☐	☐	☐	☐	☑

"Early Winner" Assessment – NF Focus Group						
Project Description Implement Transportation Smart Card Fuel, Car Maintenance, Buses, Taxis, Parking, Vehicle Registration, Provincial Ticketing, DRL, Intercity Buses, Airlines, Marine Atlantic		**Champion(s)** • Provincial Government • City • Metrobus • MUN				
Criteria	**Comments**	**Rating**				
		1	2	3	4	5
Meets perceived need	• Convenience – Too many cards	☐	☐	☐	☐	☑
Consensus support	• Will increase overtime • Possibly slow to start • Public demand will increase participation	☐	☐	☑	☐	☐
Minimal technological barriers	• Technology currently exists	☐	☐	☐	☐	☑
Minimal institutional barriers	• Consensus may be hard to reach (Government, MUN, banks, etc.)	☐	☑	☐	☐	☐
Business case	• Equipment investment may be expensive • Ease of use increased business	☐	☐	☑	☐	☐
Attracts champions	• Due to convenience to the public	☐	☐	☐	☐	☑
Contributes to ITS profile	• Focuses on integration	☐	☐	☐	☐	☑
Vital to mainline strategy	• Essentially public convenience "Increases safety and efficiency of surface transportation"	☐	☐	☐	☐	☑
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – NF Focus Group						
Project Description Signal Pre-Emption for priority areas where fire response LOS is a concern		**Champion(s)** City of St. John's				
Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Always need to reduce delay in emergency response	☐	☐	☐	☐	☑
Consensus support	• Significant benefits	☐	☐	☐	☐	☑
Minimal technological barriers	• Off-the-shelf technology	☐	☐	☐	☐	☑
Minimal institutional barriers	• No significant barriers other than cost	☐	☐	☐	☑	☐
Business case	• Public safety	☐	☐	☐	☐	☑
Attracts champions	• Success in other locations	☐	☐	☐	☑	☐
Contributes to ITS profile	• Yes	☐	☐	☐	☑	☐
Vital to mainline strategy	• Highly localized	☐	☑	☐	☐	☐
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – NF Focus Group

Project Description	**Champion(s)**
Traffic Responsive Signal System Fixed Frequency Radio Connected Consider key corridors: Thompson; Torbay	City of St. John's

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Congestion reduction • Green house gas reduced	☐	☐	☐	☑	☐
Consensus support	• Argument that reduced delays public benefit	☐	☐	☐	☐	☑
Minimal technological barriers	• Proven off-the-shelf applications	☐	☐	☐	☐	☑
Minimal institutional barriers	• No significant barriers	☐	☐	☐	☐	☑
Business case	• Significant benefit minimal overall cost	☐	☐	☐	☐	☑
Attracts champions	• To some extent	☐	☐	☑	☐	☐
Contributes to ITS profile	• Easier flow of traffic ?? ?? projection	☐	☐	☐	☐	☑
Vital to mainline strategy	• Largely localized	☐	☑	☐	☐	☐
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – NS Focus Group

Project Description	**Champion(s)**
En-Route Transit Information	Metro Transit

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Go Time is not always seen as reliable.	☐	☐	☐	☑	☐
Consensus support	• Go Time already in use, but not GPS-based.	☐	☐	☑	☐	☐
Minimal technological barriers		☐	☐	☐	☑	☐
Minimal institutional barriers	• Go Time is already supported.	☐	☐	☐	☑	☐
Business case	• GPS and dot matrix displays would make between use of existing Go Time equipment?	☐	☐	☐	☑	☐
Attracts champions		☐	☐	☑	☐	☐
Contributes to ITS profile	• New dot matrix displays would be highly visible.	☐	☐	☐	☑	☐
Vital to mainline strategy		☐	☐	☑	☐	☐
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – NS Focus Group						
Project Description En-Route Transit Information		**Champion(s)** Metro Transit				
Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	- Go Time is not always seen as reliable.	☐	☐	☐	☑	☐
Consensus support	- Go Time already in use, but not GPS-based.	☐	☐	☑	☐	☐
Minimal technological barriers		☐	☐	☐	☑	☐
Minimal institutional barriers	- Go Time is already supported.	☐	☐	☐	☑	☐
Business case	- GPS and dot matrix displays would make better use of existing Go Time equipment?	☐	☐	☐	☑	☐
Attracts champions		☐	☐	☑	☐	☐
Contributes to ITS profile	- New dot matrix displays would be highly visible.	☐	☐	☐	☑	☐
Vital to mainline strategy		☐	☐	☑	☐	☐
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – NS Focus Group						
Project Description Public Travel Security		**Champion(s)** • Metro Transit • Police Services				
Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need		☐	☐	☐	☐	☑
Consensus support		☐	☐	☐	☑	☐
Minimal technological barriers		☐	☐	☐	☐	☑
Minimal institutional barriers	• Both police and transit are under HRM. Cost may be an issue.	☐	☐	☐	☑	☐
Business case	• Reduce vandalism to buses, ferries and shelters; encourage more off-peak riders.	☐	☐	☐	☐	☑
Attracts champions		☐	☐	☑	☐	☐
Contributes to ITS profile		☐	☐	☐	☑	☐
Vital to mainline strategy		☐	☑	☐	☐	☐
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – NS Focus Group

Project Description	**Champion(s)**
Transit Traffic Light Pre-Emption/Priority	Metro Transit

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Buses get seriously delayed in traffic.	☐	☐	☐	☐	☑
Consensus support	• Some debate likely, from car drivers and Traffic Department	☐	☑	☐	☐	☐
Minimal technological barriers	• Already used by emergency vehicles	☐	☐	☐	☑	☐
Minimal institutional barriers	• Debate likely between transit and Traffic Departments.	☐	☐	☑	☐	☐
Business case	• Improved bus utilization, ridership and revenue.	☐	☐	☐	☐	☑
Attracts champions	• Innovative approach to bus transit.	☐	☐	☐	☑	☐
Contributes to ITS profile	• Helps motorists by getting more people onto buses.	☐	☐	☐	☐	☑
Vital to mainline strategy	• Would do much to increase transit ridership.	☐	☐	☐	☐	☑
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – NS Focus Group

Project Description	**Champion(s)**
Consolidating "Just In Time" Information Gathering and Dissemination for all Modes of Transport	Provincial in Partnership with Private Sector

Criteria	Comments	Rating				
		1	2	3	4	5
Meets perceived need	• Info is there it needs to be easily shared.	☐	☐	☐	☐	☑
Consensus support	• We can all benefit from shared data.	☐	☐	☐	☑	☐
Minimal technological barriers	• Perfect project for "IT".	☐	☐	☐	☐	☑
Minimal institutional barriers	• Encourage partnerships private, all levels of government.	☐	☐	☐	☐	☑
Business case	• Immediate benefits for minimal investment.	☐	☐	☐	☐	☑
Attracts champions	• Crosses many boundaries. Attracts interested parties.	☐	☐	☐	☐	☑
Contributes to ITS profile	• User needs access through "IT".	☐	☐	☐	☐	☑
Vital to mainline strategy	• Safety, efficiencies.	☐	☐	☐	☐	☑
Overall Probability of Success as "Early Winner"		☐	☐	☐	☐	☑

"Early Winner" Assessment – NS Focus Group

Project Description	**Champion(s)**
Initiate Intermodal Network	• Ports • Shippers • Commercial Carriers • EDI Port

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Identify stakeholders and "IT" potential.	☐	☐	☐	☑	☐
Consensus support	• EDI port past success.	☐	☐	☐	☑	☐
Minimal technological barriers	• Proven technologies.	☐	☐	☐	☑	☐
Minimal institutional barriers	• Numerous stakeholders.	☐	☐	☑	☐	☐
Business case	• Improve the competitiveness of ports.	☐	☐	☐	☑	☐
Attracts champions	• Goods movement industry.	☐	☐	☐	☑	☐
Contributes to ITS profile	• Goods movement industry only.	☐	☐	☑	☐	☐
Vital to mainline strategy	• Goods movement. • Intermodalism. • Regional competitiveness.	☐	☐	☐	☐	☐
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – NS Focus Group

Project Description	**Champion(s)**
Electronic Payment – Expand MacPass to Marine Atlantic, Bay Ferries, Parking Operators	- H-D Bridge Commission - Marine Atlantic - Bay Ferries - Parking Operators

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	- Improved convenience.	☐	☐	☐	☑	☐
Consensus support		☐	☐	☑	☐	☐
Minimal technological barriers	- Proven technology. - Existing tag population.	☐	☐	☐	☐	☑
Minimal institutional barriers	- High start-up cost.	☑	☐	☐	☐	☐
Business case	- Reduced operating costs.	☐	☐	☐	☐	☑
Attracts champions	- Facility operators.	☐	☐	☐	☑	☐
Contributes to ITS profile	- Visible to public.	☐	☐	☐	☑	☐
Vital to mainline strategy	- Improved mobility.	☐	☐	☐	☐	☐
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – NS Focus Group

Project Description	**Champion(s)**
Centralized Traveller Information System – 1-800, Web, HAR	Province Tourism/Industry Private Road Operators Commercial Carriers Chamber of Commerce Ferries

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Consolidated information source.	☐	☐	☐	☑	☐
Consensus support	• Recognized need.	☐	☐	☐	☑	☐
Minimal technological barriers	• Proven technologies.	☐	☐	☐	☑	☐
Minimal institutional barriers	• Partnering/funding mechanism?	☐	☐	☑	☐	☐
Business case	• Requires investment.	☐	☐	☑	☐	☐
Attracts champions	• Many potential stakeholders. • Who takes load?	☐	☐	☑	☐	☐
Contributes to ITS profile	• Very visible.	☐	☐	☐	☐	☑
Vital to mainline strategy	• Improved mobility. • Creation of wealth.	☐	☐	☐	☐	☑
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – PE Focus Group						
Project Description Public Transport Services 3.1 Optimized Fleet GPS Private and Public Busing Integration		**Champion(s)** • Municipal/Provincial/Federal Government • Existing Operators • Schools				
Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Enhanced mobility.	☐	☐	☐	☑	☐
Consensus support	• Lower at start; evolving with service and terms.	☐	☐	☑	☐	☐
Minimal technological barriers	• None.	☐	☐	☐	☐	☑
Minimal institutional barriers	• Unions/politicians (municipal & provincial).	☑	☐	☐	☐	☐
Business case	• Infrastructure exists low startup costs.	☐	☐	☐	☐	☑
Attracts champions	• Proven method of public and educational systems.	☐	☐	☐	☑	☐
Contributes to ITS profile	• Web integration would be easy.	☐	☐	☐	☑	☐
Vital to mainline strategy	• Less fossil fuel usage alleviate parking problems (city, Holland College, UPEI)	☐	☐	☐	☐	☑
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

“Early Winner” Assessment – PE Focus Group

Project Description	**Champion(s)**
2.2 Incident Management – Locate Collisions on GIS-T	Province City Enforcement Utilities

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	Collision location. Provides drive public with real time events.	☐	☐	☐	☑	☐
Consensus support	Enforcement. Planners/road design.	☐	☐	☐	☑	☐
Minimal technological barriers	GPS technology in vehicle. of GPS field/office tec.	☐	☑	☐	☐	☐
Minimal institutional barriers	They want to know this information.	☐	☐	☐	☑	☐
Business case	Identify problem areas/location. Improvements to road.	☐	☐	☐	☑	☐
Attracts champions	Enforcement. Planners.	☐	☐	☑	☐	☐
Contributes to ITS profile	Yes.	☐	☐	☑	☐	☐
Vital to mainline strategy		☐	☐	☑	☐	☐
Overall Probability of Success as “Early Winner”		☐	☐	☐	☑	☐

"Early Winner" Assessment – PE Focus Group

Project Description	**Champion(s)**
2.4 Environmental Conditions Monitoring - Province-wide RWIS system integration with Department of Agriculture and national proposed system. - Upgrade 4 existing sites, add 2 new sites.	- Province - Environment Canada - Confederation Bridge

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	- Improved highway safety and improves efficiency of highway maintenance operations.	☐	☐	☐	☑	☐
Consensus support	- Sharing of information. - No duplication. - TPW's, agriculture, all benefit.	☐	☐	☐	☑	☐
Minimal technological barriers	- Technology exists, but learning curve is substantial. - Standardization of equipment.	☐	☐	☑	☐	☐
Minimal institutional barriers	- Some inter-departmental cooperation.	☐	☐	☑	☐	☐
Business case	- Cost/benefit ratio report high significant savings to highway maintenance. - Insurance companies. - User's cost.	☐	☐	☐	☐	☑
Attracts champions	- TPW, Environment Canada, insurance agencies.	☐	☐	☑	☐	☐
Contributes to ITS profile	- Invisible to user, but significant benefits.	☐	☐	☑	☐	☐
Vital to mainline strategy	- Improves safety and service to public.	☐	☐	☐	☑	☐
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – PE Focus Group

Project Description 2.1 Traffic Control Monitoring & Control of Arterial Networks Adaptive traffic signal system for Greater Charlottetown Area to strengthen north-south and east-west corridors.	**Champion(s)** • TPW and City of Charlottetown

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Public want better traffic flow.	☐	☐	☐	☑	☐
Consensus support	• Public, city, business, retail.	☐	☐	☐	☑	☐
Minimal technological barriers	• Technology exists, but would require investment in infrastructure and learning curve.	☐	☐	☑	☐	☐
Minimal institutional barriers	• Only two governments, provincial and municipal.	☐	☐	☑	☐	☐
Business case	• Not a big problem to solve, but would improve economic growth in downtown core.	☐	☐	☑	☐	☐
Attracts champions	• Provincial government; city.	☐	☐	☑	☐	☐
Contributes to ITS profile	• Not leading edge ITS, somewhat invisible to user, but large ongoing project.	☐	☐	☑	☐	☐
Vital to mainline strategy		☐	☐	☑	☐	☐
Overall Probability of Success as "Early Winner"		☐	☐	☑	☐	☐

"Early Winner" Assessment – PE Focus Group

Project Description	**Champion(s)**
6.4 Emergency Vehicle Management Integration of emergency services communication	• Government • Emergency Services

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Inability of all main EMS agencies to communicate.	☐	☐	☐	☐	☑
Consensus support	• Agreement that safety and lives depend on early and adequate response.	☐	☐	☐	☐	☑
Minimal technological barriers	• Major differences in communication systems.	☐	☑	☐	☐	☐
Minimal institutional barriers	• Federal government budget constraints.	☐	☑	☐	☐	☐
Business case	• High cost of re-initializing systems. • Federal vs. Provincial.	☑	☐	☐	☐	☐
Attracts champions	• EMS.	☑	☐	☐	☐	☑
Contributes to ITS profile	• Uses current systems.	☐	☐	☑	☐	☐
Vital to mainline strategy	• High priority to save lives.	☐	☐	☑	☐	☐
Overall Probability of Success as "Early Winner"		☐	☐	☑	☐	☐

"Early Winner" Assessment – PE Focus Group

Project Description	**Champion(s)**
4.1 Electronic Payment Services Electronic payment for commercial vehicles – regular users of Confederation Bridge.	- APTA - Strait Crossing

Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	- Payment arrears and maintain confidentiality of financial data.	☐	☐	☐	☑	☐
Consensus support	- Currently used in other locations in Atlantic Canada.	☐	☐	☑	☐	☐
Minimal technological barriers	- Existing technology.	☐	☐	☐	☐	☑
Minimal institutional barriers	- User willingness to participate other agency cooperation.	☐	☐	☐	☑	☐
Business case	- Low cost to user. - Admin support to user. - Confidential data. - High initial cost.	☐	☑	☐	☐	☐
Attracts champions	- User driven.	☐	☐	☐	☐	☑
Contributes to ITS profile	- Uses ITS direct application.	☐	☐	☐	☑	☐
Vital to mainline strategy	- Low priority.	☐	☑	☐	☐	☐
Overall Probability of Success as "Early Winner"		☐	☐	☐	☑	☐

"Early Winner" Assessment – PE Focus Group						
Project Description 3.3 Demand Responsive Transit Management of flexibly routed transit vehicles.		**Champion(s)** • Municipalities • SIG's (i.e. seniors, handicapped) • Environmental Groups • Tourism Industry				
Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Best option for rural/low density.	☐	☐	☐	☐	☑
Consensus support	• Nova Scotia government has implemented a pilot project. • Private and charitable groups providing services in PEI.	☐	☐	☐	☑	☐
Minimal technological barriers	• Prototype application built with NS.	☐	☐	☐	☐	☑
Minimal institutional barriers	• Unknown.	☐	☐	☑	☐	☐
Business case	• Makes more efficient use of existing transportation services.	☐	☐	☐	☐	☑
Attracts champions	• Benefits groups mentioned above.	☐	☐	☐	☐	☑
Contributes to ITS profile	• Atlantic Canada has a relatively decentralized population.	☐	☐	☐	☐	☑
Vital to mainline strategy	• Supports mobility.	☐	☐	☐	☐	☑
Overall Probability of Success as "Early Winner"		☐	☐	☐	☐	☑

"Early Winner" Assessment – PE Focus Group						
Project Description 1.1 Traveller Information 1.4 Traveller Services & Reservation Develop Traveller Information System which will integrate data from various sources and disseminate over various media to facilitate travel decisions.		**Champion(s)** • Tourism Industry • Dept. of Transportation • Dept. of Tourism • Wireless Providers • Content Providers.				
Criteria	**Comments**	**Rating**				
		1	**2**	**3**	**4**	**5**
Meets perceived need	• Requirement of traveller for advanced information and timely on-route information.	☐	☐	☐	☐	☑
Consensus support	• Both government and private sector have made attempts to provide some or all components of this service.	☐	☐	☐	☐	☑
Minimal technological barriers	• Many delivery platforms available – some not historically successful (e.g. radio/cassette signal overrides with local road or weather info). • Pre-trip wireless 2.5/3G technology on-route.	☐	☐	☐	☑	☐
Minimal institutional barriers	• Control of network infrastructure and content not currently separate creating barriers to market for non-telco projects.	☑	☐	☐	☐	☐
Business case	• Business case is solid if you own the network unknown if you don't.	☐	☐	☑	☐	☐
Attracts champions	• Attracts user, content, infrastructure and industry champions.	☐	☐	☐	☐	☑
Contributes to ITS profile	• Early delivery of benefits of perceived value to wide range of audiences and stakeholders.	☐	☐	☐	☐	☑
Vital to mainline strategy	• Will be more significant if focused on user needs rather than supply side objectives.	☐	☐	☐	☐	☑
Overall Probability of Success as "Early Winner"		☐	☐	☐	☐	☑

APPENDIX F

Opportunities Analysis Workshop

ITSAtlantic
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January 23, 2002

ATLANTIC PROVINCES
REGIONAL ITS STRATEGIC PLANNING STUDY
ITS OPPORTUNITIES WORKSHOP

JANUARY 31, 2002

AGENDA

Sign-in and Refreshments (30 minutes) (8:00 a.m. – 8:30 a.m.)

Introductory Session (90 minutes) (8:30 a.m. – 10:00 a.m.)

Objective: to prepare participants to identify ITS opportunities, and build on the work performed during the User Needs Focus Groups

Activities:

Introduction:
- Welcome and Opening Remarks - Mr. David Johnstone, Deputy Minister, New Brunswick Department of Transportation
- Introduction of Participants
- Introduction of Facilitators – explanation of objectives of the workshop

ITS Overview:
- Description of Atlantic Provinces Draft ITS Vision
- Overview of the Canadian ITS Architecture, and ITS User Services
- Description of Results of the four User Needs Focus Groups

Break (15 minutes) (10:00 a.m. – 10:15 a.m.)

Operations Plan (60 minutes) (10:15 a.m. – 11:15 a.m.)

Objective: to provide input to the User Service Assessments

Activities:

Overview:
- Description of the "attributes" to be assessed for each of the fourteen "higher priority" user services
- Summary of the traditional barriers to ITS deployment

User Service Assessments:
- Consultant team provides assessment forms with some preliminary thoughts
- Participants divided into groups of five
- Group exercise – participants to review User Service Assessment forms and provide specific input on the attributes to be used, and the barriers to be overcome, in the Atlantic Provinces

Presentation of Results (45 minutes) (11:15 a.m. – noon)

Informal Presentations:

- Group leaders to present highlights of their discussions

Lunch (45 minutes) (noon – 12:45 p.m.)

Keynote Speaker:

- Brian Plant, Acting Director- ITS Office, Transport Canada

Presentations on Atlantic ITS Projects (30 minutes) (12:45 p.m. – 1:15 p.m.)

Speakers:

- (3 speakers from participants to be confirmed)

Assessment of "Early Winner" Projects (75 minutes) (1:15 p.m. – 2:30 p.m.)

Objective: to develop more details on the proposed "Early Winner" projects

Activities:
Project Development

- Product Cycle Development Process (Concept Development, Product Development, Research, Pilot, Manufacturing, Marketing, Implementation, Management)
- Plans must include:
  - Milestones by 2 years, 2-5 years, 5+ years
  - Description of each stage of product cycle development
  - Roles of stakeholders in each stage product cycle development
  - Identification of specific challenges in the areas of financing, approvals, organizational co-ordination, regulations and legislation, standards and architecture, and some specific ideas for dealing with them.
- Consultant team provides forms and materials to aid the participants in developing the projects

Break (15 minutes) (2:30 p.m. – 2:45 p.m.)

Project Presentations (1 hour) (2:45 p.m. – 3:45 p.m.)

Objective: to inform all participants of some example project designs

Activities:

- Group leaders present one example project

Closing (15 minutes) (3:45 p.m. – 4:00 p.m.)

- Economic Development and Academic Research work
- Next Steps

Appendix F – Opportunities Analysis Workshop

First Name	Company	Address	City	Prov	Postal Code	Telephone No.	Email Address
Andrew Parsons	ACOA	1801 Hollis Street, PO Box 2284, Stn. M.	Halifax	NS	B3J 3C8	(902) 426-9085	aparson@acoa-apeca.gc.ca
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Annette Kinder	Public Safety/Commercial Vehicle Enforcement	1042 Elmwood Drive	Moncton	NB	E1H 2G9	(506) 372-3290	annette.kinder@gnb.ca
Brian Ahern	Approach Navigation Systems Inc.	409 Dieppe Blvd	Dieppe	NB	E1A 6P8	(506) 854-2967	bahern@approach.nb.ca
Brian Plant	Transport Canada	27th Floor, Tower C, Area D 330 Sparks Street, Place de Ville	Ottawa	ON	K1A 0N5	(613) 998-9834	plantb@tc.gc.ca
Brian Stevens	Canadian Manufacturers & Exporters - PEI Division	PO Box 426	Charlottetown	PE	C1A 7K7	(902) 629-1555	pei@cme.ca
Brian Taylor	Halifax Regional Municipality - Metro Transit	200 Ilsley Ave	Dartmouth	NS	B3B 1V1	(902) 490-6608	taylor@region.halifax.ns.ca
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Dave MacFarlane	NBDOT	PO Box 6000	Fredericton	NB	E3B 5H1	(506) 453-2600	Dave.Macfarlane@gnb.ca
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David Loukes	Geoplan Consultants Inc	919 Prospect Street	Fredericton	NB	E3B 2T7	(506) 451-0055	loukesd@geoplan.nb.ca
David McCusker	Halifax Regional Municipality	PO Box 1749	Halifax	NS		902-490-6696	mccuskd@region.halifax.ca
Don Mason	NBDOT	PO Box 6000	Fredericton	NB	E3B 5H1	(506) 453-2213	Don.Mason@gnb.ca
Doug Shea	NFL DOT	6th Floor, Confederation Building, West Block P.O. Box 8700	St. John's	NF	A1B 4J6	(709) 729-3637	shead@mail.gov.nf.ca
Eric Gionet	Approach Navigation Systems Inc.	409 Dieppe Blvd.	Dieppe	NB	E1A 6P8	(506) 854-2967	egionet@approach.nb.ca
Eric Hildebrand	UNB Transportation Group	Head Hall, Room D126 P.O. Box 4400	Fredericton	NB	E3B 5A3	(506) 453-4521	edh@unb.ca

Appendix F – Opportunities Analysis Workshop

First Name	Company	Address	City	Prov	Postal Code	Telephone No.	Email Address
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Frank Schwartz	KPMG Consulting	Suite 400, 5121 Sackville Street	Halifax	NS	B3J 1K1	902-474-7050	frankschwartz@kpmg.ca
Gene Smallwood	McCormick Rankin & Associates Limited	2655 North Sheridan Way	Mississauga	ON	L5K 2P8	(905) 823-8500	gene.smallwood@mrc.ca
George Brooking	Trius Tours Ltd.	PO Box 2288	Charlottetown	PEI	C1A 8C1	(902) 566-5664	trius.tours@pei.aibn.com
Ginette Vienneau	CCNB - Dieppe	505, rue du College	Dieppe	NB	E1A 6X2	(506) 856-2127	ginette.vienneau@gnb.ca
Harold Hefferton	Transport Canada			NF		(709) 772-2586	hefferh@tc.gc.ca
Jack Keir	Saint John Harbour Bridge	PO Box 3728, Station B	Saint John	NB	E2M 5C1	(506) 635-1320	sihb@nbnet.nb.ca
Janet Bradshaw	St. John's Transportation Commission	245 Freshwater Road	St. John's	NF	A1B 1B3	(709) 570-2130	janetb@metrobus.com
Janice Harland	NSDOT & Public Works	PO Box 186	Halifax	NS	B3J 2N2	(902) 424-4206	HARLANDJA@gov.ns.ca
Jean-Marc Thibodeau	Public Safety/Compliance Branch	414 Collishaw Street	Moncton	NB	E1C 3C7	(506) 856-2958	Jean-Marc@gov.nb.ca
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John Allain	Codiac Transit Commission	280 Pacific Ave.	Moncton	NB	E1E 2G8	(506) 857-2008	john.allain@moncton.org
John Francis	Confederation Bridge (Strait Crossing Bridge Ltd)	PO Box 2032	Borden-Carleton	PE	C0B 1X0	(902) 437-7342	johnf@scbl.net
John Gaudet	AnyWare Group Inc.	15 Market Square, Suite 1602	Saint John	NB	E2L 1E8	506-650-5429	john.gaudet@anywaregroup.com
John Goggin	Public Safety - Operational Policy Branch	PO Box 6000	Fredericton	NB	E3B 5H1	(506) 453-8192	John.Goggin@gnb.ca
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Kendall McMenamon	AnyWare Group Inc.	15 Market Square, Suite 1602	Saint John	NB	E2L 1E8	506-643-6601	kendall,mcmenamon@anywaregroup.com
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Appendix F – Opportunities Analysis Workshop

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Appendix F – Opportunities Analysis Workshop

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IBI
GROUP

Memo

To:	Project Steering Committee ITS Working Group Workshop Participants	Date:	February 20, 2002
From:	Project Team	Steno:	rs
cc:		File No:	TO-8921

Subject: ***Atlantic Provinces Regional ITS Strategic Planning Study Opportunities Workshop - Summary Report***

INTRODUCTION

The Opportunities Workshop was held on Thursday January 31st, 2002 in Moncton, New Brunswick. There were approximately sixty participants, with representation from all four provinces. The major activities in the workshop included:

- Welcome and Opening Remarks – Mr. David Johnstone, Deputy Minister, New Brunswick Department of Transportation.
- Introductory Session – to prepare the participants to identify ITS opportunities, and build on the work performed during the User Needs Focus Groups.
- Operations Plan – to provide input to the User Service Assessments, by addressing the attributes of each of the higher priority user services.
- Presentations on Atlantic ITS Projects – Jack Keir of Saint John Harbour Bridge, Janet Bradshaw of St. John's Transportation Commission, and David Loukes of Geoplan Consultants Inc. made short presentation of ITS strategies that they have been implementing.
- Presentation by Nicole Galvin, Transport Canada, on the federal ITS program.
- Assessment of "Early Winner" Projects – to develop more details on proposed "Early Winner" projects.

OPERATIONS PLAN

During the Operations Plan segment of the Workshop, the participants were asked to provide input to the draft User Assessment Sheets. On the basis of the numbers of participants, 10 groups were formed to address the User Services that had been identified for consideration.

The following tables provide an abbreviated summary of the input as received as comments on the sheets provided to the groups. This input will be used to complete the assessment sheets, for inclusion in the Step 3 final document.

For completeness, 16 User Services (US) are included. The additional US is *5.5 Intermodal Freight Management* which was added based on the demonstrated need, and interest in intermodal operations.

1.1 Traveller Information

Key Beneficiaries	▪ Primarily owners/operators, customers, service providers and travellers
Delivery Participants	▪ Largely, Provincial Government participation is critical, and private sector involvement is important
Availability of Technologies	▪ Practically all types of communications are important including use of internet and real time aspects of the information
Operations & Maintenance Considerations of Services Provided	▪ Skill sets are not high issue
Potential Barriers	▪ Organizational issues (include availability of resources), user acceptance (timely, accurate information), and financial challenges ▪ Identification of a "champion", possibly is tourism, would be appropriate to resolve issues

1.4 Traveller Services and Reservations

Key Beneficiaries	▪ Primarily owners/operators, customers, service providers and travellers, extending to rail and air modes
Delivery Participants	▪ Federal and Provincial Governments should be involved, in addition to the private sector
Availability of Technologies	▪ Centre to Centre and Centre to Vehicle are critical linkages, possibly web-based
Operations & Maintenance Considerations of Services Provided	▪ Skill sets are not high issue
Potential Barriers	▪ Agency coordination, general buy-in from services and the public, the sustainability of revenue generation ▪ Possible to initiate a pilot project to address these issues

2.1 Traffic Control

Key Beneficiaries	▪ Primarily owners/operators, customers, service providers, travellers, enforcement authorities and emergency service providers
Delivery Participants	▪ Provincial and Municipal Governments, private sector are key agencies
Availability of Technologies	▪ Centre to Wayside and reciprocal are available regionally
Operations & Maintenance Considerations of Services Provided	▪ Skill sets are not high issue
Potential Barriers	▪ No major barriers exist since this is a mature technology application

2.2 Incident Management

Key Beneficiaries	▪ primarily owners/operators, suppliers, customers, service

	providers and travellers
Delivery Participants	- Federal Government could have a role in a 511 system nationally, otherwise Provinces and municipal road authorities are major participants
Availability of Technologies	- Centre to Wayside and Wayside to Vehicle are most important
Operations & Maintenance Considerations of Services Provided	- Skill sets are not high issue
Potential Barriers	- Organizational issues including coordination with other User Services, funding challenges and issues of servicing a large rural area where incidents occur inconsistently - Overcoming barriers should include improving awareness of and promoting incident management

2.4 Environmental Conditions Management

Key Beneficiaries	- Primarily owners/operators to reduce liability, and travellers
Delivery Participants	- All levels of government should participate
Availability of Technologies	- Wayside to Centre and Centre to Centre technologies are critical although NTCIP is not extensively used
Operations & Maintenance Considerations of Services Provided	- Skill sets are important to support data analysis requirements
Potential Barriers	- Organizational issues, financial challenges and technological inconsistencies - There are several achievable means of addressing barriers

2.5 Operations and Maintenance

Key Beneficiaries	- Primarily owners/operators, suppliers and travellers
Delivery Participants	- All levels of government should participate
Availability of Technologies	- Centre to vehicle and reciprocal are most important
Operations & Maintenance Considerations of Services Provided	- As a relatively new technology, appropriate skill sets are required regionally
Potential Barriers	- Project financing and technological advancement are issues - There are several achievable means of addressing barriers

2.6 Automated Dynamic Warning and Enforcement

Key Beneficiaries	- Primarily owners/operators, suppliers, travellers and enforcement authorities
Delivery Participants	- Provincial and Municipal Governments, private sector are key agencies
Availability of Technologies	- Wayside to Vehicle and reciprocal are important linkages for which technologies are continuing to become more available
Operations & Maintenance Considerations of Services Provided	- As a relatively new technology, appropriate skill sets are required regionally

Potential Barriers	▪ Financial, legal and user acceptance issues are likely ▪ Means of addressing issues are improved as technologies become more widely used

3.1 Public Transport Management

Key Beneficiaries	▪ Primarily owners/operators, suppliers, customers and service providers although should include taxpayers
Delivery Participants	▪ All levels of government should participate through funding and policy changes to support transit, also private sector to participate
Availability of Technologies	▪ Centre to Traveller and reciprocal are most important as GPS technologies come into increased use
Operations & Maintenance Considerations of Services Provided	▪ Skill sets are not high issue
Potential Barriers	▪ Several organizational issues including union issues, employee resistance, also funding challenges ▪ There are several achievable means of addressing barriers

4.1 Electronic Payment Services

Key Beneficiaries	▪ Primarily owners/operators, customers, service providers and travellers but many others also
Delivery Participants	▪ All levels of government can participate as can the private sector in several financially feasible ways
Availability of Technologies	▪ Centre to Wayside and Wayside to Vehicle are key, for which technologies are available
Operations & Maintenance Considerations of Services Provided	▪ Skill sets are not high issue
Potential Barriers	▪ Primary barrier to common payment methods is the control/ownership/expenses of the "backroom", also legal issues and software requirements ▪ There are several achievable means of addressing barriers

5.1 Commercial Vehicle Electronic Clearance

Key Beneficiaries	▪ Primarily owners/operators, suppliers, customers and service providers, the Atlantic Trucking Association and travellers
Delivery Participants	▪ Participation mainly by Federal and Provincial Government, the CCMTA and private sector
Availability of Technologies	▪ Most important linkages are Wayside to Centre (WIM), Centre to Centre (weighing between stations) and Wayside to Vehicle (dynamic signing)
Operations & Maintenance Considerations of Services Provided	▪ Skill sets are not high issue
Potential Barriers	▪ Several barriers are anticipated including organizational issues, financial issues and legal issues including inter-Provincial aspects ▪ Pilot projects would be appropriate means of addressing

	issues (VMS, WIM)

5.5 Intermodal Freight Management

Key Beneficiaries	- Primarily owners/operators, customers and service providers
Delivery Participants	- Federal Government as relates to rail, air and port activity, private sector
Availability of Technologies	- Technologies are readily available and in particular Wayside to Vehicle and Wayside to Centre
Operations & Maintenance Considerations of Services Provided	- Skill sets are not high issue
Potential Barriers	- Several barriers are anticipated including organizational issues, financial issues and legal issues

5.6 Commercial Fleet Management

Key Beneficiaries	- Primarily owners/operators, suppliers, customers, service providers, enforcement authorities
Delivery Participants	- Federal and Provincial Government should have roles in delivery however largely private sector
Availability of Technologies	- Practically all means of communication and the associated technologies are important and readily available
Operations & Maintenance Considerations of Services Provided	- Providing appropriate skill sets is an important requirement
Potential Barriers	- Many barriers spanning all areas of consideration - Methods to harmonize and improve communications would be suitable key means of addressing issues

6.1 Emergency Notification and Personal Security

Key Beneficiaries	- Primarily owners/operators, suppliers, customers, service providers and emergency service providers
Delivery Participants	- All levels of government should be involved as relates to road jurisdictions, transit authorities, private sector (i.e. OnStar™)
Availability of Technologies	- Technologies exist regionally including Centre to Vehicle / Traveller and reciprocal
Operations & Maintenance Considerations of Services Provided	- Providing appropriate skill sets is an important requirement
Potential Barriers	- Relate to individual willingness to pay for a service - Marketing is underway by vehicle manufacturers linked to OnStar™

6.3 Disaster Response and Management

Key Beneficiaries	- Primarily owners/operators, suppliers, travellers and emergency service providers
Delivery Participants	- All levels of government should be actively participating

	in disaster response
Availability of Technologies	▪ Communications of all types are important to support real time updates and responses
Operations & Maintenance Considerations of Services Provided	▪ Providing appropriate skill sets is an important requirement
Potential Barriers	▪ Organizational issues are most critical to a large management effort

6.4 Emergency Vehicle Management

Key Beneficiaries	▪ Primarily owners/operators, customers, service providers and travellers, enforcement agencies and emergency service providers
Delivery Participants	▪ Want to include Federal and Provincial and Municipal Governments however private sector is less important
Availability of Technologies	▪ All aspects of technologies are required to implement this
Operations & Maintenance Considerations of Services Provided	▪ Providing appropriate skill sets is an important requirement
Potential Barriers	▪ Achieving funding is viewed as a major barrier, as are organizational issues, legal issues and user acceptance ▪ There are several achievable means of addressing barriers

8.1 Weather and Environmental Data Management

Key Beneficiaries	▪ Primarily owners/operators, data researchers, travellers and emergency service providers
Delivery Participants	▪ All levels of government should participate and the private sector
Availability of Technologies	▪ Wayside to Centre and Centre to Centre communications are important
Operations & Maintenance Considerations of Services Provided	▪ Skill sets are important to support data analysis requirements
Potential Barriers	▪ Inter-agency coordination, partnering, covering rural expanses of roads, data ownership ▪ Opportunities exist to readily address barriers

ASSESSMENT OF "EARLY WINNER" PROJECTS

In the afternoon, the workshop participants were asked to develop early winner projects. They were asked to identify a project and then take that project through the entire product cycle development process. The stages in the process include:

- concept development;
- product development;
- research;
- pilot project;
- marketing;
- implementation; and
- management.

As a starting point, the participants were provided with the early winner assessments that had been performed during the four focus groups conducted in November. They were also provided with a listing of 13 sample projects for consideration. Project leaders were identified to take on the task of developing a project and the participants were divided into groups based on their interests.

For each early winner project, the teams were required to identify a name, a list of stakeholders and a list of barriers. Then, for each of the stages, the participants were asked to describe the activities, stakeholder roles, dealing with barriers and milestones. The projects that were developed are listed below. In some cases, we've provided a brief description of the concept:

- Atlantic Provinces Advanced Traveller Information System – the concept is to begin with the Province of New Brunswick, and then extend the system to other provinces;
- Atlantic Cities Red Light Camera Pilot Project;
- Quebec and Atlantic Provinces RWIS – Road and Weather Information System network, with links to a network in Quebec;
- Atlantic ITS Rural Deer and Moose Detection System – pilot project to reduce the number of vehicle/animal collisions on rural roads
- Halifax Operational Information Extranet – development of a website to provide a single portal for real-time information regarding the port operations;
- Newfoundland Integrated Information System (Weigh-in-Motion) – to provide pre-clearance for commercial vehicles across the island;
- Commercial Vehicle Border Crossing – Electronic Clearance for St. Stephen-Calais and Houlton-Woodstock International Border Crossings.
- Implementation of FAST Systems – to improve road surface conditions (safety) on bridges;
- Atlantic Canada Transaction Tag – create one transaction tag to be used on transportation facilities in different cities;
- Atlantic Canada Common Mapping Standards Transportation Network Information Warehouse.

The information collected from the product development sheets will be used in the generation of project plans at the completion of the study.

NEXT STEPS

Participants should keep in mind the following dates:

- ITS Canada annual meeting, March 25 and 26, in Toronto.
- Atlantic ITS Workshop and ITS Showcase on April 25 in Halifax.
- CTRF conference, with wrap-up Atlantic ITS Workshop, May 12 to 15, in St. John's.

We once again thank the participants for their input and enthusiasm.

APPENDIX G

USER SERVICES ASSESSMENT OPPORTUNITIES ANALYSIS

ITS USER SERVICE: 1.1 Traveller Information

The Traveller Information user service provides travellers with information prior to their departure to assist them in making mode choices, travel time estimates, and route decisions. The sub-services of the Traveller Information user service address four major functions, which are: (1) Available Services Information, (2) Current Situation Information, (3) Trip Planning Service, and (4) User Access. Information is integrated from various transportation modes and other information sources and is presented to the user for decision making.

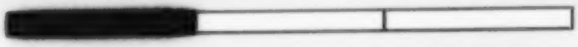
STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Government agencies: proactive approach to safer and more efficient roads • Parking Lot operators • Airports • Seaports • Rail Operators • Tourism Agencies • Ferry Service Providers • Transit Agencies • Fleet Operators (i.e. taxis) • Carriers	●
Suppliers	• Potential for financial gain in the wireless/telecom industries • IT providers	◐
Customers and Service Providers	• Customers better informed on the availability and status of transportation services. Media can provide updated reports on traffic, etc.	◐
Researchers	• Archived data can be used in weather pattern/pavement behaviour studies	◐
Special Interest Groups	• Construction Contractors in work zone areas: improved safety through provision of work zone status and traffic control information	◐
Travellers	• Travellers better informed on the availability and status of transportation services. • Tourists: promotes trip planning. • Transit patrons • Parking lot users • Ferry patrons • Airline customers • Commercial Vehicle Operators • Taxi customers • Rail Users	●
Enforcement Authorities	• Advanced information to approaching travellers could reduce enforcement demands	◐

1.1 Traveller Information

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Emergency Service Providers	• Real-time information on traffic conditions is useful for emergency service providers in responding to incidents	◐
DELIVERY PARTICIPANTS		
Federal Government	• Transport Canada • Parks Canada • ACOA • Environment Canada	◐
Provincial Government	• Departments of Transportation, Tourism, Environment • Emergency Service Providers	●
Municipal Government	• Traffic and transit agencies • Emergency service providers	◐
Non Profit / Advisory	• Tourism Agencies	◐
Private Sector	• Wireless / Telecom Carriers • Ferry Operators • Parking Lot Operators • Transit Agencies	●
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside	• Communications infrastructure is available in some areas • Real-time	●
Centre to Centre	• Products have been developed an implemented in locations outside the Atlantic Provinces	●
Centre to Vehicle / Traveller	• Existing telephone and web-based information available regarding road conditions and travel opportunities in PEI, NB, NFLD & NS • Comprehensive • Real-time • 511	●
Wayside to Vehicle	• Primarily through Dynamic Message Signs, and Highway Advisory Radio • 511 • Internet • Web-based cell services including LBS pilot	●
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets	• Most skills available regionally	◐

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus	• Lack of inter-agency coordination • Buy-in by Agencies • Lack of jurisdiction resources (i.e. human, technical, financial)	●
Project Finance	• Lack of ongoing funding • Operational revenue • Keeping up with technology	●
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations	• Lack of policies supporting partnering • Protection of intellectual property • Privacy of data	◐
User Acceptance • Technology Adaptations • Public Perceptions	• Public will be in favour of these services • Accurate • Timely • Need to establish public willingness to pay for this service	●
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• In NF and Labrador – only 10% province wide GIS coverage • No central pool for information • Wireless gaps • GIS links to mapping / GPS • Lack of common access - 511	◐
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Identification of a champion, possibly tourism would be appropriate to resolve issues	

RECOMMENDED TIMEFRAME



0 - 3	4 - 7	8 - 10	YEARS
"Early winner"	**Medium term**	**Longer term**	

Primary	●
Secondary	◐
Not Applicable	○

ITS USER SERVICE: 1.4 Traveller Services and Reservations

The Traveller Services Information user service provides the traveller with access to "yellow pages" type information regarding a variety of travel-related services and facilities. The information will be accessible to the traveller in the home or office to support pre-trip planning and while enroute, either in the vehicle or at public facilities such as public transit terminals or highway rest stops.

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Ferry Service Providers • Hospitality Industry (e.g. Hotels, restaurants) • Airline Companies • Rail Operators • Transit Agencies • Tourism Agencies • Parking Lot Operators • Rental Car Agencies	●
Suppliers	• Potential for financial gain in the wireless/telecom industries • IT providers	◐
Customers and Service Providers	• Tourism Industry • CAA	◐
Researchers	• No direct benefit	○
Special Interest Groups	• Disabled persons groups	○
Travellers	• Tourists • Ferry Patrons • Airline Customers • Rail Users • Transit Patrons • Taxi Customers • Parking Lot Users	●
Enforcement Authorities	• No direct benefit	○
Emergency Service Providers	• No direct benefit	○
DELIVERY PARTICIPANTS		
Federal Government	• Promotes tourism in Canada • Parks Canada • Heritage Canada	◐
Provincial Government	• Departments of Tourism	●
Municipal Government	• Promotes tourism	○

1.4 Traveller Services and Reservations

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Non Profit / Advisory		○
Private Sector	• Wireless / Telecom Carriers • Tourist Boards, Chambers of Commerce • Entire Tourism sector	●
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside	• Applicable standards	○
Centre to Centre		●
Centre to Vehicle / Traveller	• Existing telephone and web-based information available regarding road conditions and travel opportunities in Prince Edward Island, New Brunswick, Newfoundland and Nova Scotia • cell and phone • 511 (travel info)	●
Wayside to Vehicle	• Tourism signing • Electronic signing	○
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets	• Most skills available regionally	◐
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus	• Lack of inter-agency coordination • Lack of "champion" to lead a consolidated effort • Buy in	●
Project Finance	• Availability of "seed" money to start up a service • Beneficiaries would be interested in proof of value before contributing to operation • Sustainable revenue	●
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations	• Lack of policies supporting partnering • Protection of intellectual property	◐
User Acceptance • Technology Adaptations • Public Perceptions	• Public will be in favour of these services	●

1.4 *Traveller Services and Reservations*

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Web-based reservation systems already widely in use • In-vehicle use limited by market penetration of in-vehicle products • Cell phones to access travel information on 511 • Gaps in wireless coverage • Gaps in GIS coverage	◐
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Pilot project to support business case • Need to identify champion for the Region	

RECOMMENDED TIMEFRAME					
■	□	□		**Primary**	●
0 - 3 **"Early winner"**	**4 - 7** **Medium term**	**8 - 10** **Longer term**	**YEARS**	**Secondary**	◐
				Not Applicable	○

ITS USER SERVICE: 2. 1 Traffic Control

The Traffic Control user service manages the movement of traffic on streets and highways. It includes surface street controls such as traffic signal systems, adaptive traffic control systems and freeway control techniques such as ramp metering and lane control. Between the eight sub-services of the Traffic Control user services, the following four functions are provided which are (1) Traffic Flow Optimization, (2) Traffic Surveillance, (3) Control Function, and (4) Provide Information.

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Can lead to reduced fuel costs and emissions • Government agencies: proactive approach to safe and efficient roads	●
Suppliers	• Equipment manufacturers	●
Customers and Service Providers	• More efficient and safer transportation systems • Road users • Pedestrians, cyclists	◐
Researchers	• Researchers can study the impact an effectiveness of implementing traffic control systems	◐
Special Interest Groups	• Insurance companies	◐
Travellers	• All road users benefit from safer and more efficient traffic operations	●
Enforcement Authorities	• Fewer collisions to investigate • Policing agencies	●
Emergency Service Providers	• Provides ability to implement emergency vehicle priority systems	◐
DELIVERY PARTICIPANTS		
Federal Government	• As part of greenhouse gases reduction strategy	◐
Provincial Government	• Participate in funding and operations where provincial roads are present	●
Municipal Government	• Design, fund, operate and maintain the systems	●

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Non Profit / Advisory		○
Private Sector	• Provide the system components	●
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside	• Mature market • Signal actuation	●
Centre to Centre	• Products have been developed and implemented in locations outside the Atlantic Provinces	◐
Centre to Vehicle / Traveller		○
Wayside to Vehicle	• Mature market – traffic control signals, dynamic message signs	●
Wayside to Wayside	• Some systems developed for highway/rail crossings • Red light camera technologies readily available	◐
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets	• Basic skill sets available – challenge is to keep staff current with developing technologies and systems	●
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus	• Lack of inter-agency coordination	●
Project Finance	• Lack of ongoing funding	●
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations	• Debate over ownership of systems software • Procurement practices treating traffic control systems as a commodity can lead to problems	●
User Acceptance • Technology Adaptations • Public Perceptions	• Travellers may be resistant to the implementation of more sophisticated traffic control strategies.	◐
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Pace of development of industry standards such as NTCIP	●

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Increased public acceptance/awareness through education/advertising • Pass legislation to support automated traffic control strategies	

RECOMMENDED TIMEFRAME

■	☐	☐	
0 - 3	**4 - 7**	**8 - 10**	**YEARS**
"Early winner"	**Medium term**	**Longer term**	

Primary	●
Secondary	◐
Not Applicable	○

ITS USER SERVICE: 2.2 Incident Management

The Incident Management user service enhances existing capabilities to identify incidents, formulate response actions, and support initiation and ongoing co-ordination of those response actions. The single sub-service of the Incident Management user service provides six major functions such as: (1) Scheduled Planned Incidents, (2) Identify Incidents, (3) Formulate Response Actions, (4) Support Co-ordinated Implementation of Response Actions, (5) Support Initialization of Response to Actions, and (6) Predict Hazardous Conditions.

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Incident Management systems have been proven to reduce congestion, secondary collisions, improve safety and efficiency of road systems • Can lead to reduced fuel costs and emissions	●
Suppliers	• Potential of financial gain in wireless / Telecom industries • Systems are equipment intensive	●
Customers and Service Providers	• More efficient and safer transportation systems • All road users	●
Researchers	• Data collection can be used to test incident management strategies	◐
Special Interest Groups	• Of interest to public road safety groups • Hazardous materials/spills • Collision investigation groups	◐
Travellers	• Retaining roadway efficiency provides all road users, including commuters, tourists and commercial traffic better accessibility and reduces economic impacts to those industries.	●
Enforcement Authorities	• Early detection and timely clearing of an incident can minimize the potential for secondary collisions	◐
Emergency Service Providers	• Improved response times can save lives and minimize delays in treatment of injuries	◐
DELIVERY PARTICIPANTS		
Federal Government	• Trans Canada Highway • As part of greenhouse gases reduction strategy • As part of an Atlantic "511" system	◐
Provincial Government	• Provincial highways and roads	●
Municipal Government	• Urban and other rural arterial roads	●
Non Profit / Advisory		○

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Private Sector	• Financial opportunity if partnered with road authority	◐
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside	• Widespread wireless availability • Experience in Atlantic provinces with RWIS • Confederation Bridge TMS • Halifax SCOOT	●
Centre to Centre		◐
Centre to Vehicle / Traveller	• Cell phones • Web-based products	◐
Wayside to Vehicle	• Dynamic message signs (Confederation Bridge)	●
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets	• Most skills available regionally	◐
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus	• Lack of mechanisms available for inter-agency coordination • Coordination with other user services interlinked with traveler information	●
Project Finance	• Lack of appropriate funding. Large geographic areas, low density population	●
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations	• Lack of policies supporting partnering	◐
User Acceptance • Technology Adaptations • Public Perceptions	• Reductions in delays and improved incident response should be positive	◐
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Lack of standards and the issue of interoperability • Lack of wireless communications in rural areas	◐

2.2 *Incident Management*

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Raising awareness of the benefits of incident management • Pilot programs (i.e. Confederation Bridge) • Opportunities to link accident data and images to GIS-T	

RECOMMENDED TIMEFRAME					
■	□	□		**Primary**	●
0 - 3	**4 - 7**	**8 - 10**	**YEARS**	**Secondary**	◐
"Early winner"	**Medium term**	**Longer term**		**Not Applicable**	○

ITS USER SERVICE: 2.4 Environmental Conditions Management

The Environmental Conditions and Monitoring user service provides government agencies with the capability to enhance their air quality control strategies. The function provides wide area and Wayside emissions monitoring as well as Road Weather Systems and Services. Information is used by Traffic Demand Management in the Traffic Management Centre to mitigate pollution and may be provided to enforcement agencies to compel offenders to comply with standards. In addition, road weather information and forecasts provide inputs to other systems such as ATMS and ATIS to increase safety and efficiency.

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Government agencies – more efficient management of road maintenance activities (eg. Snow removal) • Reduced liability exposure	●
Suppliers	• Market potential in equipment manufacture/installation	◐
Customers and Service Providers	• Provides road patrols with data to be more efficient with winter road maintenance	◐
Researchers	• Studies of weather patterns/pavement behaviour / de-icing	◐
Special Interest Groups	• Environmental groups • Agricultural • Fire Protection • Aviation • Construction Contractors	◐
Travellers	• Enhanced air quality, road surface during adverse weather, traveler warnings	●
Enforcement Authorities	• Used to monitor emissions violators	◐
Emergency Service Providers	• Reduced number of collisions – reduced demands on emergency service providers	○
DELIVERY PARTICIPANTS		
Federal Government	• Transport Canada • Environment Canada	◐
Provincial Government	• Departments of Transportation and Environment • Agriculture • Forestry	●
Municipal Government	• On urban and other rural roads	●
Non Profit / Advisory		○

2.4 *Environmental Conditions Monitoring*

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Private Sector	• Wireless / Telecom Carriers • Road Maintenance Services • Weather Forecasters	◐
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside	• Readily available locally	●
Centre to Centre	• Readily available locally • NTCIP standard not complete	●
Centre to Vehicle / Traveller	• Existing telephone and web-based information available regarding road conditions in PEI, NB, NFLD & NS	◐
Wayside to Vehicle		○
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets	• Lack of existing skills to analyze data	◐
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus	• Lack of mechanisms available for inter-agency coordination	●
Project Finance	• Lack of appropriate funding	●
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations	• Lack of policies supporting partnering	◐
User Acceptance • Technology Adaptations • Public Perceptions		○
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Standardization of equipment required	◐

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education		

RECOMMENDED TIMEFRAME			
■	□	□	
0 - 3 **"Early winner"**	**4 - 7** **Medium term**	**8 - 10** **Longer term**	**YEARS**

Primary ●

Secondary ◐

Not Applicable ○

ITS USER SERVICE: 2.5 Operations and Maintenance

The Operations and Maintenance user service provides government agencies, as well as contractors with the resources to manage the operations and maintenance of vehicle fleet and equipment assets, and monitor and manage traffic flow around work zone areas.

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Government Agencies • Road agencies • Construction Contractors	●
Suppliers	• New markets and field • Opportunities internationally for test bed • Modern fleets in Atlantic Canada (electronic engine and spreader controls)	●
Customers and Service Providers		○
Researchers	• Use of ITS for operations and maintenance activities is a relatively new field. • Opportunity for University traffic, safety and mechanical centers of excellence	◐
Special Interest Groups	Non-government operators	◐
Travellers	• Safer roads	●
Enforcement Authorities	• Safety enforcement in work zones	○
Emergency Service Providers		○
DELIVERY PARTICIPANTS		
Federal Government	• Trans Canada Highway • NHS	●
Provincial Government	• Department of Transportation	●
Municipal Government	• Municipal fleet groups • Road maintenance groups	●
Non Profit / Advisory		○
Private Sector	• Road maintenance groups • Fleet agencies	○
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside		○

2.5 *Operations and Maintenance*

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Centre to Centre		○
Centre to Vehicle / Traveller	• Operations and maintenance vehicles tracked using GPS	●
Wayside to Vehicle	• Some technologies are based on communication between Wayside markers, and in-vehicle systems • Service center	◐
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets	• Relatively new technology	◐
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus	• Introduction of sophisticated technology to operations and maintenance activities	◐
Project Finance	• Can require substantial financing	●
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations	• Liability if systems fail	◐
User Acceptance • Technology Adaptations • Public Perceptions	• Operations and maintenance staff not accustomed with operating ITS	◐
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Relatively new technology	●

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Public Private Partnerships	

RECOMMENDED TIMEFRAME			
☐	■	☐	
0 - 3 **"Early winner"**	**4 - 7** **Medium term**	**8 - 10** **Longer term**	**YEARS**

Primary	●
Secondary	◐
Not Applicable	○

ITS USER SERVICE: 2.6 Automated Dynamic Warning and Enforcement

The Automated Dynamic Warning and Enforcement user service provides systems, which warn vehicles or motorists of imminent danger, and provide electronic enforcement of traffic control and regulations.

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Government agencies: proactive approach to safe and efficient roads • Road agencies • Carriers	●
Suppliers	• Supply and operation of equipment and systems	●
Customers and Service Providers		○
Researchers	• Relatively new field • Candidate for research	◐
Special Interest Groups	• Road maintenance groups	◐
Travellers	• Safer roadways for all road users (commercial, cyclists, pedestrians, commuters)	●
Enforcement Authorities	• Another tool to increase enforcement of traffic control and regulations	●
Emergency Service Providers	• Reduced number of collisions – reduced demands on emergency service providers	◐
DELIVERY PARTICIPANTS		
Federal Government	• Transport Canada	◐
Provincial Government	• Departments of Transportation • Police Forces • Public Safety Departments	●
Municipal Government	• Traffic Departments • Policing agencies	●
Non Profit / Advisory		○
Private Sector	• Equipment and system installation • Potential system operators	●
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside		○
Centre to Centre		○

2.6 *Automated Dynamic Warning & Enforcement*

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Centre to Vehicle / Traveller	• Signal pre-emption	◐
Wayside to Vehicle	• Speed enforcement devices • Red light camera devices • Dynamic speed limit signs	●
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets	• As a relatively new technology, appropriate skill sets are required regionally	◐
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus	• May require partnerships to justify implementation	◐
Project Finance	• Systems are costly to implement and operate • Ability to offset costs with revenue generation is a significant issue	●
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations	• Privacy is an issue when using image recording equipment • Legislation required to implement electronic enforcement	●
User Acceptance • Technology Adaptations • Public Perceptions	• Public may perceive electronic enforcement as primarily a revenue generation strategy	●
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment		○
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Means of addressing issues are improved as technologies become more widely used	

2.6 *Automated Dynamic Warning & Enforcement*

STRATEGIC PLAN ATTRIBUTES **ASSESSMENT**

RECOMMENDED TIMEFRAME

■	□	□	
0 - 3 **"Early winner"**	**4 - 7** **Medium term**	**8 - 10** **Longer term**	**YEARS**

RATING

Primary	●
Secondary	◐
Not Applicable	○

ITS USER SERVICE: 3.1 Public Transport Management

The Public Transport Management user service applies advanced vehicle electronic systems to various public transportation modes and uses the data generated by these modes to improve service to the public. It includes operation of vehicles and facilities, planning and scheduling, and personnel management.

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Transit system operators • Fleet management agencies • Monitor during vehicle operation • Better planning tools • Improve response to emergencies	●
Suppliers	• Systems are equipment intensive • Opportunity to develop new system technology	●
Customers and Service Providers	• Improved transit services – more efficient operations • Increased usage • Reduced complaints • Improved customer access to information	●
Researchers	• More opportunities to expand technologies and its uses • Find new application for existing technologies • Improve reliability of existing technologies	●
Special Interest Groups	• Disabled people services to improve reliability and accessibility • To promote public transit as an alternate use to single occupancy vehicles • taxpayers	●
Travellers	• Availability of real-time information makes public transit more attractive to tourists • Cost-effective service • Reduce traffic congestion and air pollution	●
Enforcement Authorities	• Improved fare adherence • Assistance in dispatching emergency services	●
Emergency Service Providers		○
DELIVERY PARTICIPANTS		
Federal Government	• As part of greenhouse gases reduction strategy • Currently not very active in public transit funding • Need increased level of fiscal support	●
Provincial Government	• Departments of Transportation • Need to increase fiscal support • Develop transit friendly legislation	●

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Municipal Government	• Transit Agencies • Traffic Departments	●
Non Profit / Advisory	• CUTA • Local advisory committee • Advocacy groups	◐
Private Sector	• Equipment and system installation suppliers • Private operators • Other lien companies • Advertisers using travel medium	●
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside	• Mature market • More communication with vehicle	●
Centre to Centre	• Interface with road operators, snow ice central • Intermodal connection • Emergency services	●
Centre to Vehicle / Traveller	• Changing technology (GPS) • Growing use by operators • Costs are reducing	●
Wayside to Vehicle	• Customer information • Location identification • Expand applications for technology	●
Wayside to Wayside	• Not commonly used	○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets	• Requires training on integrating electronics and software on vehicles • Regional GIS industry skill sets • GO-Time system • SCOOT signal pre-emption	●
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus	• Technical support from supplier • Employer resistency • Various government levels • Increase need to train employers on operation and maintenance • Enhance information and usability of service	●
Project Finance	• Systems are costly to implement and operate – require a sound business case • Need funding partners	●

3.1 Public Transport Management

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations	• Liability is not a major risk • There may be privacy issues with employees or fare technologies • Transit agencies interested in using technologies rather than selling it	◐
User Acceptance • Technology Adaptations • Public Perceptions	• Need to get operation to change management practices and public acceptance • Improved information to customers • Reduced ridership	●
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Technology is evolving – from use of Wayside "markers", to GPS	◐
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Educate employees to get buy in • Market importance of advances to maintain a modern alternative to car • Proactive in enhancing transit use to reduce car use • Multi-level government funding support • Financial potential for transit through gas tax • Smartcard / fare integration expansion • Commitment to Kyoto commitment • Increased ridership • Improve attractiveness of transit option	

RECOMMENDED TIMEFRAME				
■	□	□		**Primary** ●
0 - 3	**4 - 7**	**8 - 10**	**YEARS**	**Secondary** ◐
"Early winner"	**Medium term**	**Longer term**		**Not Applicable** ○

ITS USER SERVICE: 4.1 Electronic Payment Services

The Electronic Payment Services user service allows travellers to pay for transportation services by electronic means. Between the four sub-services of the Electronic Payment user services the following functionality is provided: (1) Electronic Toll Collection, (2) Electronic Fare Collection, (3) Electronic Parking Payment, and (4) Electronic Payment Services Integration. It may, as envisioned, also serve broad non-transportation functions and may be integrated with credit and debit cards in banking and other financial transactions.

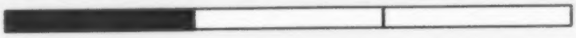
STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Tolling operators • Transit system operators • Commercial vehicle operators • Parking operators • Drive-thrus • Gas stations • Ferry Terminals • Airports • Taxis • Commercial / retail developers	●
Suppliers	• Provide equipment	○
Customers and Service Providers	• Commuters experience reduced travel times • More efficient payment methods • One backroom • More security – less chance of fraud • Better management for customer	●
Researchers	• Trend analysis • Peak traffic periods • Technology research	○
Special Interest Groups	• Transportation associations • Auto associations • Environmental groups • Government agencies	○
Travellers	• Efficiency for tourists, truck drivers, daily commuters, business travellers	●
Enforcement Authorities	• RCMP • Local police • Commercial vehicle enforcement • Parking enforcement	○
Emergency Service Providers	• Police • Fire • Ambulance • EMR's • Tow Trucks	○

4.1 Electronic Payment Services

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
DELIVERY PARTICIPANTS		
Federal Government	• Border Crossings • Toll collection • Revenue generation • Subsidy payments	●
Provincial Government	• Encourage partnerships • Tourism • Highway maintenance / safety	◐
Municipal Government	• Transit Agencies • Parking Authorities • Bridge authorities	●
Non Profit / Advisory	• Trucker associations • Charities	◐
Private Sector	• Financial institutions • Tolling Operators • Parking Facilities • Retailers • Gas stations • Drive Thru operators • Suppliers (i.e. software and hardware)	●
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside	• Available tolling infrastructure	●
Centre to Centre		○
Centre to Vehicle / Traveller		○
Wayside to Vehicle	• Available tolling infrastructure • MacPass experience (30% in Nova Scotia)	●
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets	• Well developed industry	◐
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus	• Lack of integration amongst required parties (e.g. financial institutions, payment systems, etc.) • Requires one backroom – who gets the backroom becomes the barrier	●

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Project Finance	• Substantial initial investment, including back office functions (financial transactions) • Expenses of running the backroom	●
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations	• Privacy issues • Intellectual property issue • Contractual issues	●
User Acceptance • Technology Adaptations • Public Perceptions	• Public required to change payment habits • This barrier is changing now	◐
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Standards still evolving • Custom software	◐
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Government funding for start-ups • Resolution of backroom • Good business case	

RECOMMENDED TIMEFRAME



0 - 3	4 - 7	8 - 10	
"Early winner"	**Medium term**	**Longer term**	**YEARS**

Primary	●
Secondary	◐
Not Applicable	○

ITS USER SERVICE: 5.1 Commercial Vehicle Electronic Clearance

The Commercial Vehicle Electronic Clearance user service consists of both domestic and international border electronic clearances. Domestic electronic clearance allows commercial vehicles to continue past inspection stations without stopping. International border clearance allows vehicles to bypass international border checkpoints without stopping, or at least with expedited checks. As a vehicle approaches an inspection station or checkpoint, vehicle to Wayside communications take place that identify the vehicle and make available to authorities the necessary data about credentials, vehicle weight, safety status, cargo, and occupants. Enforcement personnel can then select potentially unsafe vehicles for inspection and allow safe and legal vehicles to bypass the inspection station/checkpoint.

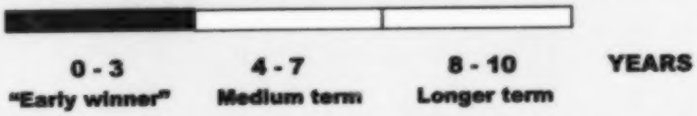
STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Carriers and shippers • Road agencies • Canada Customs and Revenue • U.S. Customs through reduced congestion	●
Suppliers	• Equipment supply	●
Customers and Service Providers	• Transportation productivity will lower the cost of goods and services to the public	○
Researchers		○
Special Interest Groups	• Atlantic Trucking Association but lacks full membership to be represented	○
Travellers	• Increased efficiency for CV operators (i.e. reduced stop/idling time, expedited checks at inspection points) • Safety improved as more resources freed to monitor at-risk vehicles • Province as a whole benefits – 70% trade	●
Enforcement Authorities	• Enforcement agencies can potentially select unsafe vehicles for inspection and allow safe vehicles to bypass checkpoint	◐
Emergency Service Providers	• No direct benefit	○
DELIVERY PARTICIPANTS		
Federal Government	• Border Crossings (International) • Customs and Revenue Agencies	●
Provincial Government	• Vehicle safety enforcement • Education for developing HR and assisting with the transfer of technology	●
Municipal Government		○

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Non Profit / Advisory	- CCMTA for communication and to bring other provinces on side	○
Private Sector	- Carriers and shippers - Suppliers – transferable technology to user	●
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside	- Vehicle/driver records - Weigh-in-motion	●
Centre to Centre	- Norpass etc. - Weighing between stations (need technology)	◐
Centre to Vehicle / Traveller		○
Wayside to Vehicle	- In-vehicle data collection and management - Road signs - Variable messaging	●
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets	- Outside of Atlantic Region	◐
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues - Inter-agency coordination - Intra-agency coordination - Partnerships - Changing skill sets - Customer Focus	- Requires information sharing between Canada and US (institutional differences exist) - Negotiate a sharing arrangement for permit revenues	●
Project Finance	- Financing is an issue for smaller operators - Purchasing transponders - Communication infrastructure - Public/private mix	●
Legal - Liability - Privacy - Intellectual Property - Procurement Practices - Policy / Legislations	- Legislative restrictions on data exchange - Drivers/operators may have privacy concerns - Uniform standards for loads in Atlantic Canada – reciprocal agreements - Safety of trucks when weigh in motion is used	◐
User Acceptance - Technology Adaptations - Public Perceptions	- Adoption of technology may be an issue for smaller operators	◐

5.1 *Commercial Vehicle Electronic Clearance*

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Incomplete wireless communications coverage • Absence of standards for information exchange and safety inspections across provinces • Confusion among truckers about when to stop or proceed	◐
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Pilot projects (border crossing, weigh-in-motion) provide opportunity to visit operation / policy concerning ITS deployment • Interprovincial legislation • Safety (i.e. allowing enforcement staff to concentrate on unsafe vehicles)	◐

RECOMMENDED TIMEFRAME



Primary	●
Secondary	◐
Not Applicable	○

ITS USER SERVICE: 5.5 Intermodal Freight Management

The intermodal freight management user service provides systems which will monitor the status of freight-in-transit and at freight terminals.

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Carriers and shippers • Intermodal terminals (e.g. Halifax, St. John, Moncton) • Ferry services operators • Sea ports	●
Suppliers	• Equipment suppliers	●
Customers and Service Providers	• More efficient fleet operations • Shippers (i.e. improved ability to operate "just-in-time", reduced delay, better management control, more effective integration with regulating agencies/systems) • Atlantic Trucking Association	●
Researchers	• Improved data in freight movement to extent information is not proprietary	◐
Special Interest Groups		○
Travellers		○
Enforcement Authorities		○
Emergency Service Providers	• Improved access to electronic information on loads particularly hazardous materials • GPS type system linked to cargo type – immediate awareness	◐
DELIVERY PARTICIPANTS		
Federal Government	• Implementation for own fleets (e.g. Canada Post)	◐
Provincial Government		○
Municipal Government		◐
Non Profit / Advisory		○
Private Sector	• Carriers and shippers (including couriers) - system Implementation	●
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside		○

5.5 Intermodal Freight Management

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Centre to Centre		○
Centre to Vehicle / Traveller		○
Wayside to Vehicle	• Vehicle identification and station information transmittal systems are in use	●
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets	• Outside of Atlantic Region	◐
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus		○
Project Finance	• Financing is an issue for smaller operators • New technologies are available at a premium price	●
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations	• Legislative restrictions on data exchange • Shippers, drivers and operators may have privacy concerns – proprietary / competitive information	◐
User Acceptance • Technology Adaptations • Public Perceptions	• Adoption of technology may be an issue for smaller operators • Training	◐
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Incomplete wireless communications coverage • Communication and information exchange standards	◐

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Choose one intermodal terminal for pilot project.	

RECOMMENDED TIMEFRAME			
■	□	□	
0 - 3 **"Early winner"**	**4 - 7** **Medium term**	**8 - 10** **Longer term**	**YEARS**

Primary ●
Secondary ◐
Not Applicable ○

ITS USER SERVICE: 5.6 Commercial Fleet Management

The Commercial Fleet Management user service provides real-time communications for vehicle location, dispatching and tracking between commercial vehicle drivers, dispatchers, and intermodal transportation providers, thereby reducing delays for drivers and providing commercial drivers and dispatchers with real-time routing information in response to congestion or incidents. Commercial fleet management includes the management of taxi fleets.

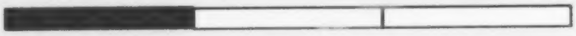
STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Carriers and shippers • Taxi Fleet • Intermodal terminal (airports, ports, railway terminals) • Other fleets	●
Suppliers	• Equipment suppliers	●
Customers and Service Providers	• More efficient fleet operations • Shippers (i.e. improved ability to operate "just-in-time", reduced delay, better management control, more effective integration with regulating agencies/systems) • Taxi customers (i.e. reduced service delays)	●
Researchers	• Improved data in freight movement to extent information is not proprietary	◐
Special Interest Groups		○
Travellers	• Taxi passengers • Shuttle bus passengers	○
Enforcement Authorities	• Terminal operators can better control vehicle movements	◐
Emergency Service Providers		○
DELIVERY PARTICIPANTS		
Federal Government	• Implementation for own fleets (e.g. Canada Post) • Integration with customs and revenue • CCRA • Agriculture • U.S federal agencies • Weather services	○
Provincial Government	• Implementation for own fleets (e.g. maintenance, etc.) • Integration with safety, weight regulation functions	◐
Municipal Government	• Implementation for own fleets (e.g. transit, etc.) • Integration (transit) with public traveler information systems	◐

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Non Profit / Advisory	• APTA • Community college • Chamber of Commerce • Economic Council	○
Private Sector	• Carriers and shippers (including couriers) - system Implementation • Taxi operators	●
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside	• Electronic credentialing (including safety) systems are in use (for public sector regulatory functions)	●
Centre to Centre	• Electronic credentialing (including safety) systems are in use (for public sector regulatory functions)	●
Centre to Vehicle / Traveller	• Electronic credentialing (including safety) systems are in use (for public sector regulatory functions) • Taxi, courier dispatch systems are in use • Carrier, shipper dispatch systems are in use	●
Wayside to Vehicle	• Vehicle identification and station information transmittal systems are in use	●
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets	• Outside of Atlantic Region	◐
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus	• Skill sets of terminal operator's staff	◐
Project Finance	• Financing is an issue for smaller operators • New technologies are available at a premium price	●
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations		○
User Acceptance • Technology Adaptations • Public Perceptions	• Adoption of technology may be an issue for smaller operators • Training	◐

5.6 Commercial Fleet Management

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Incomplete wireless communications coverage • Communication and information exchange standards	◐
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Retain third party to implement	

RECOMMENDED TIMEFRAME



0 - 3	4 - 7	8 - 10	YEARS
"Early winner"	Medium term	Longer term	

Primary	●
Secondary	◐
Not Applicable	○

ITS USER SERVICE: 6.1 Emergency Notification and Personal Security

The Emergency Notification And Personal Security user service provides the capability for the user to manually initiate a distress signal for incidents like mechanical breakdown or non-injury collisions. An automated system would help mitigate the consequences of a serious collision by automatically sending information regarding the location, nature and severity of the collision to an emergency services dispatcher and/or to hospital and emergency room personnel.

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Government agencies: proactive approach to safe and efficient roads • Other Operators of public transportation facilities and services	●
Suppliers	• Supply systems	●
Customers and Service Providers	• Provide emergency notification monitoring services	●
Researchers	• No direct benefit	○
Special Interest Groups		○
Travellers	• Quicker response to emergencies	●
Enforcement Authorities		○
Emergency Service Providers	• Quickly and accurately notified of emergencies	●
DELIVERY PARTICIPANTS		
Federal Government		○
Provincial Government	• Emergency Services, Transportation	●
Municipal Government	• Emergency Services, Transportation	●
Non Profit / Advisory		○
Private Sector	• Wireless / Telecom Carriers • Emergency notification – conveyed to Emergency Service providers	●
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside		○
Centre to Centre		○

6.1 Emergency Notification and Personal Security

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Centre to Vehicle / Traveller	• Automotive companies	●
Wayside to Vehicle		○
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets		○
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus		○
Project Finance	• Primarily based on customer payment	●
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations		○
User Acceptance • Technology Adaptations • Public Perceptions	• Public willingness to pay for service	●
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Installation of equipment in vehicles • Lack of standards for in-vehicle applications (e.g. Mayday)	●
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Introduce legislation to make the service mandatory	

6.1 Emergency Notification and Personal Security

STRATEGIC PLAN ATTRIBUTES **ASSESSMENT** **RATING**

RECOMMENDED TIMEFRAME

☐	■	☐	
0 - 3 **"Early winner"**	**4 - 7** **Medium term**	**8 - 10** **Longer term**	**YEARS**

Primary	●
Secondary	◐
Not Applicable	○

ITS USER SERVICE: 6.3 Disaster Response and Management

The Disaster Response and Management user service co-ordinates disaster response strategies from a virtual control centre, and disseminates information to agencies and individuals on traffic conditions, diversion routes etc.

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	- Government agencies: proactive approach to safe and efficient roads	●
Suppliers	- Supply systems	●
Customers and Service Providers		○
Researchers		○
Special Interest Groups		○
Travellers	- Clear information on actions to take in the event of a disaster	●
Enforcement Authorities		○
Emergency Service Providers	- Clear response plans with the required tools	●
DELIVERY PARTICIPANTS		
Federal Government	- Transport Canada	◐
Provincial Government	- Transportation, Health	●
Municipal Government	- Transportation, Emergency Services	●
Non Profit / Advisory		○
Private Sector		○
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside	- Traffic control systems - Dynamic message signs	●
Centre to Centre	- Through radio systems, internet	●
Centre to Vehicle / Traveller		○

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Wayside to Vehicle	• Highway advisory radio • Dynamic message signs	●
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets		○
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus	• Information sharing, control at the scene • Before September 11, 2001, disasters considered rare and therefore disaster planning had lower priority.	●
Project Finance		○
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations		○
User Acceptance • Technology Adaptations • Public Perceptions	• Agencies responsible for disaster response planning may be resistant to technological solutions	◐
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Lack of standards for in-vehicle applications (e.g. Mayday)	○
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Educate agencies responsible for disaster response planning – role that ITS can play	

6.3 Disaster Response and Management

STRATEGIC PLAN ATTRIBUTES **ASSESSMENT** **RATING**

RECOMMENDED TIMEFRAME

☐	■	☐	
0 - 3 **"Early winner"**	**4 - 7** **Medium term**	**8 - 10** **Longer term**	**YEARS**

Primary	●
Secondary	◐
Not Applicable	○

ITS USER SERVICE: 6.4 Emergency Vehicle Management

The Emergency Vehicle Management Service user service is oriented towards reducing the time from the receipt of notification of an incident by an emergency services dispatcher, and the arrival of emergency vehicles on the scene. It includes emergency vehicle fleet management, route guidance to the incident scene or a suitable hospital, and pre-emption of traffic signals on an emergency vehicle's route to receive more green displays.

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	Timely cleanup of incidents reduces potential for secondary collisions, and alleviates congestion related to incident	●
Suppliers	Potential for financial gain (e.g. material supply and systems)	◐
Customers and Service Providers	More confidence More reliable information	●
Researchers	Actual field data could be used to assess effectiveness of emergency vehicle management systems	◐
Special Interest Groups	Insurance agencies	◐
Travellers	expedited response at the scene of a collision may save lives	●
Enforcement Authorities	Faster response times Integration	◐
Emergency Service Providers	efficient fleet management improved accident response times	●
DELIVERY PARTICIPANTS		
Federal Government	Standards with respect to equipment and information flow National coordination in terms of regional meetings, consultation	◐
Provincial Government	More involved in regional opportunities	●
Municipal Government	Fire service / police / ambulance	●
Non Profit / Advisory		○
Private Sector		○

6.4 *Emergency Vehicle Management*

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside	• Emergency vehicle pre-emption systems at traffic signals	●
Centre to Centre	• Telecommunications systems links between emergency vehicle dispatch centres	●
Centre to Vehicle / Traveller	• Hospitals to ambulances	◐
Wayside to Vehicle	• Several different vehicle pre-emption systems available	●
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets	• High	◐
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus	• Development and implementation of STR	●
Project Finance	• Pre-emption systems require extensive field equipment	●
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations	• Private information on airways • Dispatch to wrong locations	○
User Acceptance • Technology Adaptations • Public Perceptions	• Public perception	○
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Interoperability	◐

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Promote as a potential strategy to deal with stress on emergency services budgets • Regional meetings	

RECOMMENDED TIMEFRAME			
	■		
0 - 3 **"Early winner"**	**4 - 7** **Medium term**	**8 - 10** **Longer term**	**YEARS**

Primary	●
Secondary	◐
Not Applicable	○

ITS USER SERVICE: 8.1 Weather and Environmental Data Management

The Weather and Environmental Data Management user service provides system wide gathering, fusion, and dissemination of information on roadway weather conditions and forecasts.

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
KEY BENEFICIARIES		
Owners/Operators	• Road authorities; increased road safety and efficiency • Road winter maintenance operators – effective management of resources (e.g. fleet, salt)	●
Suppliers	• Data management system suppliers	◐
Customers and Service Providers		○
Researchers	• Provides a data warehouse for research	●
Special Interest Groups		○
Travellers	• Supports early detection and notification of adverse conditions for route selection or trip planning	●
Enforcement Authorities		○
Emergency Service Providers	• Realtime information and advance notification of adverse conditions useful to response agencies	●
DELIVERY PARTICIPANTS		
Federal Government	• Environment Canada	●
Provincial Government	• Transportation, Environment	●
Municipal Government	• Transportation Department	●
Non Profit / Advisory		○
Private Sector	• Database management systems	●
AVAILABILITY OF TECHNOLOGIES		
Centre to Wayside	• Data transfer from field equipment to centre	●
Centre to Centre	• Web-based data sharing	●
Centre to Vehicle / Traveller		○
Wayside to Vehicle		○

STRATEGIC PLAN ATTRIBUTES	ASSESSMENT	RATING
Wayside to Wayside		○
OPERATIONS AND MAINTENANCE CONSIDERATION OF SERVICES PROVIDED		
Available Skill Sets		●
KNOWN BARRIERS TO IMPLEMENTATION BY DELIVERY PARTICIPANTS		
Organizational Issues • Inter-agency coordination • Intra-agency coordination • Partnerships • Changing skill sets • Customer Focus	• Inter-agency coordination • Partnerships to create data warehouses	●
Project Finance	• Coverage in rural areas may be financially difficult to justify given low traffic volumes	●
Legal • Liability • Privacy • Intellectual Property • Procurement Practices • Policy / Legislations	• Ownership of data	●
User Acceptance • Technology Adaptations • Public Perceptions		○
Technical • Standards and Architecture • Availability of Enabling Technologies • Availability and Infiltration of Field Equipment	• Integration into existing ARWIS sites / programs	◐
Potential Actions to Resolve Barriers • Financial Grants • Improved Electronic Communications • Changes to Policies / Legislation • Introduce Standards • Improve Skill Sets • Privatization/Partnerships • Public Education	• Start with pilot project involving public/public partnership, or public/private partnership	

STRATEGIC PLAN ATTRIBUTES **ASSESSMENT** **RATING**

RECOMMENDED TIMEFRAME

■	□	□	
0 - 3 **"Early winner"**	**4 - 7** **Medium term**	**8 - 10** **Longer term**	**YEARS**

Primary	●
Secondary	◐
Not Applicable	○

APPENDIX H

DETAILED TECHNOLOGY DESCRIPTIONS

SURVEILLANCE

The functional area of surveillance is broken into 9 technology areas:

- Traffic – Table H.1
- Vehicle Status – Table H.2
- Environmental – Table H.3
- Vehicle Monitoring – Table H.4
- Driver Monitoring – Table H.5
- Cargo Monitoring – Table H.6
- Obstacle Ranging and Lane Tracking – Table H.7
- Security – Table H.8
- Location Determination – Table H.9

Each of the above technology areas is detailed more extensively in the following tables. Icons indicating each technology's existing maturity are provided. These maturity assignments are defined as follows (referring to the year 2010 as the end of the "near term" deployment window):

- ● **Mature:** Current commercially available technology supports the identified ITS requirements in this area. Deployment of the candidate ITS Services is not predicated on further research and development of these technologies. *Candidate ITS Services with dependencies only on these mature technologies should be deployable prior to 2010 with low risk.*

- ◕ **Mature with rapid innovation:** Current commercially available technology supports the identified ITS requirements. The area is one of rapid technology growth that indicates that the basic support provided by current technologies will likely be superseded within the period to 2010. While further research and development is not required to support ITS, future deployment may benefit from technology enhancements that should not be precluded by excessive rigidity in the architecture or deployment definitions. *Candidate ITS Services with dependencies only on this class of technologies should be deployable prior to 2010 with low performance risk and medium cost risk, based on obsolescence.*

- ◐ **Mixed:** This technology area is required to satisfy a range of ITS requirements including some that are not supported by current technology. Useful services may be deployed using currently available technologies; however, satisfying all ITS Service requirements will require additional research and development to bolster the identified deficiencies. Where this assignment is made, the associated description in highlights the specific areas where technology advancement is required. *Candidate ITS Services with dependencies only on these "mixed" technologies may not be deployable prior to 2010 without significant technical risk.*

- ◔ **Immature:** Additional research and development is required before technologies in this area can be cost-effectively and reliably applied to support the candidate ITS Services. In some cases, potentially suitable technologies have been applied in defence or aerospace applications, but not in commercial transportation applications. Additional research and development is still required in these areas to address the unique mass production, safety, and cost issues associated with larger commercial markets. *Candidate ITS Services with dependencies only on these immature technologies may not be deployable prior to 2010 under any risk scenario.*

Table H.1 – Traffic Sensors

TECHNOLOGY AREA: TRAFFIC SENSORS

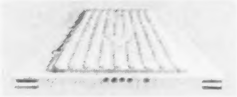
Traffic sensor technologies monitor overall traffic flow conditions and enable collection of basic aggregate measures such as occupancy, volume, and speed. These traffic sensors may be installed in three locations, On Pavement, In Pavement and/or on the Roadside.

On Pavement: There are a number of devices that may be placed on the pavement that may be used for vehicle detection, including loop mats, pressure plates, and magnetometers.

In Pavement: There are three devices used for detecting vehicles that are embedded in the pavement, namely inductive loops, magnetic probes, and sensing cables. Since the devices are embedded in the pavement they are disruptive to traffic flow during installation and maintenance and are prone to problems with pavement deterioration. In-pavement detection is currently the prevailing detection sensor technology.

Roadside/Overhead Mounted: Off-pavement sensors such as video imaging, radar, laser, ultrasonic sensing, and automatic vehicle identification (AVI) are now challenging in-pavement technologies for market share. Off-pavement sensors are typically mounted on overhead or roadside structures and therefore are less disruptive to traffic during installation and maintenance.

Below, is a more detailed description for each of the different technologies. Each technology is grouped together in their respective location for installation (i.e. On-pavement, In-pavement and Roadside/Overhead Mounted).

ON-PAVEMENT	**Loop Mats** ◖ Loop Mats are similar to conventional inductive loops, in that they generate an electromagnetic field, which is disturbed as a vehicle passes over, except loop mats are not embedded in the pavement. Designed for temporary use. 
	Pressure Plates ◖ Pressure Plates detect vehicles because when wheels pass over the pressure plate electrical contact occurs. Limited to detecting axles, not vehicles, and therefore cannot measure most traffic parameters.
	Magnetometer ◔ A Magnetometer measures changes in Earth's magnetic field as a vehicle passes over.

TECHNOLOGY AREA: TRAFFIC SENSORS

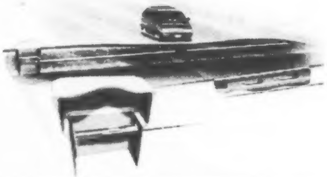
IN-PAVEMENT

Inductive Loops ●

Inductive Loops are the most common type of detector and generate an electromagnetic field, which is disturbed as vehicles pass over. Inductive loops are widely used in various applications such as traffic signal intersections, toll gates and free flowing highways. Inductive Loops, with the help of an amplifier, generate a magnetic field. As a vehicle passes over the loop, the loop's magnetic field decreases. The amplifier is then tuned to detect this change in magnetic field therefore detecting the presence of a vehicle.

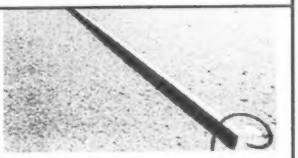
Magnetic Probes ◐

Magnetic Probes measure changes in the Earth's magnetic field in order to determine when vehicles pass over.



IN-PAVEMENT

Sensing Cable ◔



When vehicles pass over sensing cable, the wheels compress piezo-electric cable, which in turn generates an electric signal. Cannot measure most traffic parameters, limited to detecting axles.

ROADSIDE MOUNTED

Video Imaging ◕

Video image processing sensors utilize the visible light and near infrared bandwidths to sense various user-configurable traffic parameters. Video imaging allows for traffic flow information to be obtained for multi-lane and multi-zone applications. However, the requirement to digitize the video images and invoke pattern recognition routines requires significant processing power in the field. A video imaging sensor can provide speed and volume information and can also be used for incident detection and traffic signal control. Video imaging sensors represent a very promising future standard for traffic flow detection, due in part to steadily improving performance, increased features/flexibility and decreased costs.

TECHNOLOGY AREA: TRAFFIC SENSORS

Radar ◕

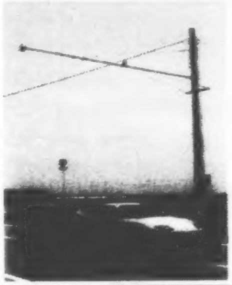
Two technologies are:

1) Doppler radar sensors provide very accurate speed measurements and can distinguish between approaching and receding traffic. The principal drawback characteristic of this technology is the inability to measure presence and therefore it cannot provide traffic flow or occupancy information. However, many traffic authorities use this sensor when collection of speed data is a priority, such as for travel time monitoring. Doppler radar technology is robust, and performs well under all ambient environment conditions. It is typically mounted overhead.
2) True presence microwave radar using frequency modulated continuous wave (FMCW) detects volume, presence and calculates speeds over multiple independent zones. Unlike Doppler microwave radar sensors, FMCW radar can be mounted in a side-fire configuration. However, speed data in side-fire mode presently has limited accuracy. The advantages of the FMCW radar sensors are its ease of installation and integration into existing systems, its high accuracy, programmability to support a variety of applications, and its low cost

Laser ◔

Laser detection systems utilize a very narrow beam width, which allows for the spatial positioning of a vehicle on the road and the resolution of the vehicle shapes within an accuracy of ±10cm. Laser based sensor technologies offer high accuracy and reliability, however this is sensitive to mounting height and sensor position over the roadway. One drawback is the requirement for a high signal to noise ratio in all prevailing weather conditions in order to reliably process a reflection from the vehicle target. Laser sensors can collect lane specific speed, volume and occupancy and can operate remotely with batteries and a solar panel, and use a spread spectrum radio link to transmit traffic data from the remote site to a traffic control data collection/transmission location.

Ultrasonic Sensing ◔



Ultrasonic sensors transmit and receive an acoustic wave that is analyzed to determine vehicle volume. A local microprocessor can process the data to determine vehicle speed, occupancy and perform some limited vehicle classification. Reported results indicate that ultrasonic sensing provides fairly good accuracy.

TECHNOLOGY AREA: TRAFFIC SENSORS

Automatic Vehicle Identification ◖

Automatic Vehicle Identification (AVI) technology deployed for ETC and CVO applications may be used to provide road link travel time data between AVI antennae for both freeway and arterial networks. This relatively accurate travel time data is well-suited to ATIS applications. In addition, AVI technology can provide information on traffic volumes based upon measured levels of penetration of AVI equipped vehicles. Agencies such as the Inter Agency Group in the New York City area have successfully demonstrated large scale deployment of AVI probe-based ATMS/ATIS applications.

Table H.2 – Vehicle Status Sensors

TECHNOLOGY AREA: VEHICLE STATUS SENSORS

Vehicle Status Sensors which determine individual characteristics of passing vehicles. Technologies which assess individual vehicle length, weight, number of axles, lane position, and speed are available. Enforcement application technologies that monitor emissions, passenger counts, and operational status for specific vehicles are less mature.

Vehicle Classification ◕

Classification of vehicles is undertaken for the purpose of regulatory compliance, automatic toll collection, commercial vehicle operation, and historical data collection. Vehicle classification is generally performed through devices embedded in the pavement, or mounted along the roadside. The table below indicates what vehicle information can be obtained by the applicable technologies.

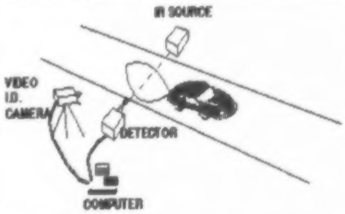
Looking ahead, there is continuing development of infrared or radar based profile technologies. The market will continue to be driven by CVO and ETC applications.

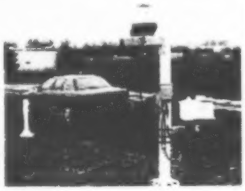
VEHICLE CLASSIFICATION	Technology	Weigh-in-Motion	Vehicle Height	Vehicle Length	Axles
	Inductive Loops: Inductive loops can be used for classification on the principle that the percentage change in conductance can be used to determine the type of vehicle on the basis of vehicle length. Loops are not as accurate as other classification technologies.			X	
	Pressure Sensors: Pressure sensors, such as a pressure plate, and piezo-electric strips are used extensively for weigh-in-motion applications.	X			X

TECHNOLOGY AREA: VEHICLE STATUS SENSORS					
	Profile Identifiers: Profile identifiers may include a variety of mounting configurations and technologies. Most applications are either mounted overhead or side-fired and utilize reflective beam technologies such as infrared, optical, ultrasonic or microwave/radar. A beam of energy is continuously monitored by the detection device, which essentially measures the physical dimensions of a vehicle as it passes through the detection zone. Profile identifiers may also be used as overheight detectors at low overpasses.		X		

Vehicle Emissions ◖

A variety of enabling technologies have been developed outside of the ITS arena to detect harmful vehicle emissions. These technologies include conductive polymers, fibre optic, and infrared sensors. In order to integrate these technologies into ITS applications, sensor(s) must be configured such that they can distinguish specific pollutants (HC_x, CO, and No_x), and be bundled with related field components and processing. Emission sensing may be done from the vehicle or from the roadside.



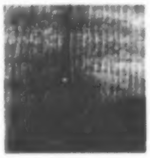


An example of an ITS application of emissions sensing is in California, where the emission sensors are used to trigger plate readers with optical character recognition for passive emissions enforcement on freeway entrance ramps. Currently, the market for this type of application is limited, however it is expected to increase as more authorities take a proactive approach to vehicle pollution.

Table H.3 – Environment

TECHNOLOGY AREA: ENVIRONMENT

Environmental Sensors ●



Environment sensor technologies monitor local climate (temperature, humidity, precipitation, wind, pollution) and road surface status (dry, wet, ice, snow). A road weather information system (RWIS) monitors current conditions on and immediately adjacent to the roadway. Road temperature and condition sensors embedded in the surface of the pavement typically measure road surface temperature, moisture, and residual chemical factor in either a passive or active mode. Environment sensors measure air temperature and relative humidity as well as wind speed and direction. Other atmospheric sensors may include precipitation sensors as well as visibility sensors. More modern sensors include infrared cameras to assess road surface condition.

Meteorologists use the road data collected from the sensors to provide road condition forecasting services for road maintenance and various road user groups. The collected road weather information is monitored and analyzed to detect and forecast environmental hazards such as icy road conditions, dense fog, and approaching severe weather fronts. This information can be used to more effectively deploy road maintenance resources, issue general traveller advisories, and support location specific warnings to drivers using Traffic Information Dissemination. Technical advancements in this area focus on the integration of sensor data with predictive algorithms.

Table H.4 – Vehicle Monitoring

TECHNOLOGY AREA: VEHICLE MONITORING

Closed-Circuit Television (CCTV) Cameras ●

CCTV is an essential element of visual surveillance for ITS. CCTV consists of various elements of security industry grade equipment including the CCTV camera/lens unit, control equipment and the communication system, which connects the camera to a control centre. The primary objective of a CCTV camera is to provide surveillance of freeway / highway segments or intersections and visual confirmation of incidents, however it may also be used to detect incidents. A secondary benefit is the monitoring of environmental conditions including precipitation and visibility. CCTV supports other applications including vehicle classification and enforcement.

The performance of CCTV cameras can be affected by the speed at which they pan/tilt and their level of zoom capabilities. Digital signal processing (DSP) provides a number of improvements over conventional analogue signal processing. CCTV technologies evolve rapidly, driven by the security industry. Near term evolutions will include increasingly compact, low cost imagers, with compressed digital video output.

Table H.5 – Driver Monitoring

TECHNOLOGY AREA: DRIVER MONITORING

Driver Monitoring Sensors

Driver Monitoring Sensors are technologies which monitor driver condition by monitoring driving characteristics and/or other psycho-physiological symptoms associated with impaired performance.

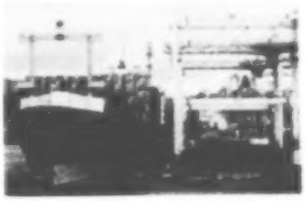
A variety of organizations including major auto-makers are developing and testing sensors intended to identify driver fatigue or impairment and initiate alarms. Examples include infrared sensors to detect driver eye movement. While these technologies are in their infancy, future widespread deployment could significantly improve road and rail safety.

Table H.6 – Cargo Monitoring

TECHNOLOGY AREA: CARGO MONITORING

Cargo Monitoring Sensors

Cargo Monitoring Technologies monitor various indicators of cargo status. Load distribution, temperature, acceleration, and pressure are among potential indicators that may be monitored depending on the nature of the cargo.



Freight administration processes track cargo location and the cargo security/condition. This information can be communicated to a central fleet and freight management system via a range of wireless communications infrastructure such as DSRC. Interconnections are provided to intermodal shippers and intermodal freight depots for tracking the cargo from source to destination. Sensors can provide monitoring of various parameters such as temperature and humidity.

Table H.7 – Obstacle Ranging and Lane Tracking

TECHNOLOGY AREA: OBSTACLE RANGING AND LANE TRACKING

Obstacle Ranging Sensors

Obstacle Ranging Technologies detect and characterize potential obstacles (other vehicles, people, road debris) in a vehicle's vicinity. Supports family of applications with variable performance requirements. Advanced headway maintenance requires high frequency and precision. Driver warning systems may have reduced requirements due to human time scale. Vision enhancement sensors must support overall environment imaging.

TECHNOLOGY AREA: OBSTACLE RANGING AND LANE TRACKING

Lane Tracking Sensors ◔

Lane tracking technologies located on-board a vehicle monitor the position of the vehicle with respect to the travel lane and optionally support interpretation of travel lane geometry ahead of the vehicle. For situations where no roadway support (e.g. magnetic tape) is added, the technology rating drops to "immature".

The externally mounted longitudinal and lateral sensors establish definable fields for object detection. These sensors are used to detect vehicles (or objects) that the vehicle is approaching, or that are approaching the vehicle, in order to provide warnings and/or assume temporary control of the vehicle if a collision is imminent.

Longitudinal/lateral control sensing is predominantly a research and development area, with few products currently emerging into the ITS market. Enabling technologies being explored include microwave, radar, lidar, ultrasonic sensing, and video image processing. Currently, the trend in in-vehicle sensor technology is focused on radar and lidar technology.

A number of technologies are available and are being developed to enhance vision capabilities for ITS vehicles. These technologies include infrared, video image processing and ultraviolet headlamps. These enhancement systems will improve visually acquired information in situations where driving visibility is low, such as at night or reduced visibility due to an obstruction to vision such as fog or falling snow.

Table H.8 – Security

TECHNOLOGY AREA: SECURITY

Security ●

Security technologies provide surveillance of, and restrict access to, secure public areas. Card readers that restrict access and closed circuit television cameras are examples.

The ITS industry draws upon a number of security industry technologies and hence there are opportunities to add value to ITS applications through security system inter-operability. Parking facilities offer particular opportunities. CCTV can be used for occupancy monitoring and site security; and DSRC technology as deployed for toll applications can be used for access control.

Transit security provides for the physical security of transit passengers. An on-board security system is deployed to perform surveillance and warn of potentially hazardous situations. Public areas (e.g. stops, park and ride lots, stations) are also monitored. Information is communicated to the Transit Management Subsystem using the existing or emerging wireless (vehicle-to-centre) or wireline (area-to-centre) infrastructure. Security related information is also transmitted to the Emergency Management Subsystem when an emergency is identified that requires an external response.

Table H.9 – Location Determination

TECHNOLOGY AREA: LOCATION DETERMINATION

Location Determination is a technology which determines absolute position. Examples include GPS and other systems which apply multi-lateration to known locations, either terrestrial or space based. Augmenting these technologies are those that measure travel path and distance (e.g., odometer, compass, gyroscope) from a known location. Very high-precision systems associated with vehicle control applications are one remaining research area.

Global Positioning System (GPS) ●

GPS is a Satellite Navigation System that is funded by and controlled by the U.S. Department of Defense. While there are many thousands of civil users of GPS world-wide, the system was designed for and is operated by the U.S. military. GPS provides specially coded satellite signals that can be processed in a GPS receiver, enabling the receiver to compute position, velocity and time. Four GPS satellite signals are used to compute positions in three dimensions and the time offset in the receiver clock.

There are two different levels of GPS service, the Precise Positioning Service (PPS) and the Standard Positioning Service (SPS). PPS uses cryptographic equipment and keys and specially equipped receivers and is limited to U.S. military and government agencies use. SPS is available to civil users world-wide, but has less accuracy when compared to PPS. Accuracy is typically within 10m, and performance in urban canyons is a particular issue. Accuracy can be significantly improved using a differential GPS (DGPS) service which uses a commercial pager network or FM subcarrier service to calibrate the GPS receiver based upon local reference points with known co-ordinates.

GPS is relatively mature technology. Looking ahead, the focus will be on integrating GPS with other applications. For example, GPS may be used in intelligent vehicles, or in cellular phones within vehicles, in order to perform Automatic Vehicle Location (AVL).

DATA PROCESSING

Inherent to carrying out each of the ITS user services is data processing. This is the process by which the information gathered from a variety of sources is brought together, managed, manipulated and disseminated to some output by one form or another.

Data Processing is broken into two main functional areas: algorithms and information management. Processing technology and advanced algorithms enable advanced vehicle and traffic control applications. The function of information management is made up of information storage, fusion, and retrieval systems management.

Table H.10 – Data Processing

TECHNOLOGY AREA: DATA PROCESSING

Algorithms

There are a number of custom software programs that are used to effectively and efficiently manage traffic conditions. These include incident/congestion detection algorithms, real-time traffic signal optimization, route optimization, and traffic simulation models.

Detection Algorithms: Detection algorithms include automatic incident detection (AID) algorithms, queue detection and tracking algorithms and route optimization. AID algorithms are generally based on either pattern recognition techniques or prediction models and can be classified as either comparative or single station algorithms. Comparative algorithms are those that compare traffic characteristics at adjacent stations and single station algorithms perform temporal comparisons at a single station. In Canada, two AID algorithms have had practical application for ATMS. These algorithms are the McMaster Algorithm and the All-Purpose Incident Detection (APID) Algorithm.

Looking ahead, there is increasing emphasis on congestion detection versus incident detection. Queue detection logic is used to detect congestion (with no concern as to the cause) at each detector station. Queue tracking logic is then applied to monitor the end and beginning of the queue. The major purpose of queue detection and tracking is safety. The back of a queue is turbulent and dangerous. Given proper information, DMS messages can alert a motorist of congestion ahead.

Real-time Signal Optimization: There are a number of software packages developed that may be used in real-time to optimize signal timings on a road network so that the total throughput is maximized or the total delay is minimized. This section examines two common real-time signal optimization systems, SCOOT and SCATS.

SCOOT

SCOOT (Split Cycle Offset Optimization Technique) is an advanced implementation of computer-based urban traffic control. It is an adaptive traffic control strategy that operates in concert with a discreet UTC. The key functions of SCOOT are to:

- Measure Cyclic Flow Profiles (CFP's) in real-time. This allows the arrival of platoons of vehicles at a signal to be forecast;
- Update an on-line model of queues continuously. This provides an estimate of stop line congestion;
- Incrementally optimize signal settings. Split, cycle and/or offset can be adjusted by a few seconds each cycle to best address the demands on all approaches.

SCOOT uses vehicle detectors to measure traffic flow profiles in real-time. The detectors are placed near the upstream end of each link to measure the demand pattern of vehicles approaching the downstream signal. Information from the detector on the downstream link is also utilized to update the estimated saturation flow rate. The traffic data is continuously processed by the SCOOT algorithm to allow signal timing to adapt in real-time to traffic changes.

TECHNOLOGY AREA: DATA PROCESSING

SCATS

SCATS (Sydney Co-ordinated Adaptive Traffic System) is a computer based area traffic control system. It is a complete system consisting of hardware, software, and control strategy. Operating in real-time, it adjusts signal timings throughout the system in response to variations in traffic demand and system capacity. As with any area traffic control system, the purpose of SCATS is to optimize traffic flow on an area-wide basis, rather than on the basis of individual intersections.

SCATS operates in real-time through the regional computer which analyses detector information pre-processed by intersection controllers. The algorithms in the regional computer select, in response to detected flow and occupancy data, the appropriate splits, offsets and cycle lengths for each subsystem and the offsets that apply between subsystems.

Route Optimization: Efficient route management not only reduces the number of vehicles required to perform a given operation, but also impacts on traffic and environmental conditions. For commercial fleets, especially in the pickup and delivery business, route optimization software and implicit algorithms are the key technology. This is a point-to-point or node-based routing application that automatically determines the optimum street sequences to perform a desired task.

In waste management and street/roadway maintenance operations such as snow ploughing, salting/sanding and street cleaning, a more sophisticated link-based routing is employed that considers both sides of the street and multiple lanes. Route optimization software can reduce the number of vehicles required to perform a given set of tasks by 15% to 30%.

Information Management

Regional Traffic Control: Regional traffic control advances Surface Street Control and Freeway Control by adding the communications links and integrated control strategies that enable integrated interjurisdictional traffic control. This regional traffic control provides for the sharing of traffic information and control among traffic management centres to support a regional control strategy. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions. Regional traffic control relies principally on roadside instrumentation supported by the Surface Street Control and Freeway Control and adds hardware, software, and wireline communications capabilities to implement traffic management strategies which are co-ordinated between allied traffic management centres. Several levels of co-ordination are supported from sharing of information through sharing of control between traffic management centres. This information sharing is facilitated through the application of open systems and database technologies.

Incident Management System: An incident management system manages both predicted and unexpected incidents so that the impact to the transportation network and traveller safety is minimized. Requisite incident detection capabilities are included in the Freeway Control System (or ATMS) and through regional co-ordination with other traffic management and emergency management centres, weather service entities, and event promoters supported by this market package. Information from these diverse sources is collected and correlated by the incident management systems to detect and verify incidents and implement an appropriate response. An incident management system provides Traffic Management Subsystem equipment that supports traffic operations personnel in developing an appropriate response in co-ordination with emergency management and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications and presentation of information to

TECHNOLOGY AREA: DATA PROCESSING
affected travellers using traffic information dissemination. The same equipment assists the operator by monitoring incident status as the response unfolds. The co-ordination with emergency management might be through a CAD system or through other communication with emergency field personnel. This co-ordination is facilitated through the application of open systems and database technologies. The co-ordination can also extend to tow trucks and other field service personnel.

CONTROL

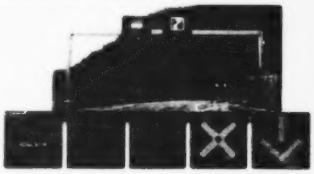
The technology area of "Control" can be divided into three categories: Signals – Table H.11; Signs – Table H.12 and Vehicle – Table H.13.

Signal control technologies include freeway and arterial lane control signs, freeway ramp metering, and arterial intersection traffic signals.

Sign control technologies provide a variety of Dynamic Message Sings including those which include interface to vehicle-roadside communications technologies enabling complementary in-vehicle displays.

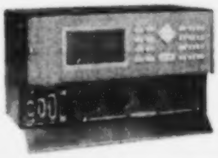
Automated vehicle control technologies that provide on-board collision avoidance and auto-navigation systems are in relative infancy.

Table H.11 – Signals

TECHNOLOGY AREA: SIGNALS
Lane Control ● A lane control system provides signing for lane use and speed limits. Motorists are advised of safe maximum speeds in relation to road surface, weather and/or traffic conditions. Speeds and throughputs during congestion may be improved. Lane closures in response to incidents, maintenance or construction may be expedited. A lane control system may reduce shock waves and resultant secondary collisions. The use of lane signals also enables counter-flow operations. 
Ramp Metering ● The objective of a ramp metering system is to reduce the recurring congestion on freeways without increasing overall network delay. This is achieved by regulating access to the expressway by signal control of the on-ramp. The flow of entering traffic is smoothed, reducing bottleneck and shock wave effects. Drivers using metered ramps may alter their driving pattern either spatially (using an alternate route) or temporally (leaving earlier or later) which may reduce the peak load on the system.

TECHNOLOGY AREA: SIGNALS

Traffic Signals ●



Intersection traffic signal controllers have traditionally employed custom industry-standard controllers such as the National Equipment Manufacturers Association (NEMA) standard. Additionally, signal control can be facilitated using a standard PC-based field microprocessor known as the Advanced Traffic Controller (ATC), or the California standard 2070 controller.

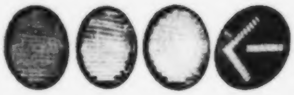
Table H.12 – Signs

TECHNOLOGY AREA: SIGNS

Light Emitting Diodes (LED) ◕

Light Emitting Diode (LED) displays use pixels comprised of clusters of high intensity LEDs. Each LED is recessed in a black cylinder to minimize the impact from direct sunlight.

The main characteristics of LED DMS are:



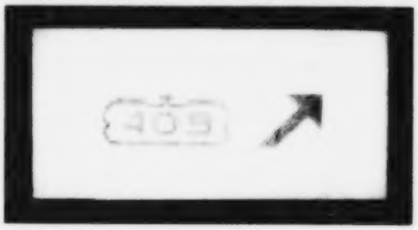
- Solid state construction with availability of multiple colours for a broad range of applications;
- Low routine maintenance requirements;
- Rapid pace of technological development and improvement;
- Potential for long term degradation of LED output;
- Higher power consumption and heat generation relative to other DMS technologies.

LED signs are gaining widespread acceptance and are evolving as the standard technology of the future for DMS.

TECHNOLOGY AREA: SIGNS

Liquid Crystal Display ◐

Liquid Crystal Display (LCD) technology has been traditionally used for a wide variety of indoor signing applications. LCDs are usually used as solid-state shutters with fluorescent tubes being used as the back light source. However, the light passed through a LCD in its "light transmission mode" is insufficient for outdoor applications and the technology has not developed to the point where it can be used with confidence in the outdoor roadway environment. Introducing reflective material to the LCD to reflect more light through it in its "light transmission mode" improves outdoor performance. These so-called transreflective LCDs have been applied to shuttering light emitted from fibre optics, but this requires two LCDs in series to effectively interrupt the light. In addition, the LCDs have a high attenuation thus demanding greater light source power. Other major obstacles to the use of LCDs for roadway applications are insufficient contrast ratios and operating temperature restrictions.



In recent years, there have been extensive amounts of research initiated to increase contrast ratio thus increasing visibility. There are several characteristics that make LCD's attractive for DMS applications, including completely solid state, compact design, and wide viewing angle. LCD may emerge as a viable DMS technology over the next five years.

Hybrid Signs ●

There are two types of hybrid signs: Fibre/Flip Disk and LED/Flip Disk. Fibre/Flip Disk signs employ reflective flip disks with each disk having a small opening to expose the end of an illuminated fibre strand. The disk employs a shield, which blocks the fibre end, when the disk is blank. Hybrid LED/Flip disks employs a similar configuration with disk openings exposing an LED pixel. The main characteristics of these technologies are improved visibility over conventional LED and fibre displays when display is exposed to direct sunlight, uninterrupted operation in the event of power failure (if desired), and potentially high maintenance requirements associated with degradation of moving parts and reflective disks.

Rotating Drums ●

The rotating drum, or limited state, sign is capable of displaying a variety of different messages depending on the number of drums and the number of sides of its drums. For example, if a sign has two drums with 4 sides, this provides a theoretical limit of 16 message combinations. However, only a fraction of message combinations would be valid. The resulting small message library severely limits the amount and type of information that can be displayed on the sign.

Table H.13 – Vehicle

TECHNOLOGY AREA: VEHICLE

Vehicle Control ◔

Automated vehicle control technologies are in relative infancy. Most of the world's major automakers have developed demonstration applications, such as the San Diego pilot by the National Automated Highway Consortium in the U.S. These technologies will emerge on the market as a collection of discrete market driven features, such as the adaptive cruise control feature offered by Daimler Chrysler. Control applications will only become viable following widespread proliferation of driver warning applications.

TRAVELLER INTERFACE

Technologies in this area have audio, visual and tactile interface capabilities that interact with travellers (e.g. with a driver during vehicle operation, or with an operator at a control centre). There are three main areas that traveller interface can be divided into: Driver Interface – Table H.14; Traveller Interface – Table H.15 and Operator Interface – Table H.16.

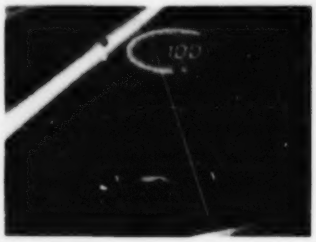
Console displays, heads up displays and synthesized speech are primary examples of mature technologies in the driver interface category. Technologies enabling voice input and non-distracting visual enhancement of the driver's view are less mature. For the traveller and operator interfaces, the same technologies used in driver interface applications are used with some varied constraints. For example, extreme portability requirements restrict interface options for hand-held devices. Additional capabilities, including hard copy options, for fixed presentation devices may also be required.

Table H.14 – Driver Interface

TECHNOLOGY AREA: DRIVER INTERFACE

Driver Interface ◕

Drivers and passengers within a vehicle are able to obtain a variety of information, through a variety of methods. Tailored information may also be obtained based on real-time interactive response to a traveller's request and based on a submitted traveller profile. Information obtained may include: environmental conditions; road surface conditions, including sanding/salting status; traffic conditions including: indications of congestion levels, possible incidents, road maintenance or closures, and expected travel times; vehicle conditions; collision warnings; ride share/ride match; parking management; pricing.



This information may be obtained within the vehicle through audio in the form of Highway Advisory Radio (HAR), regular radio reports, interactive voice response (IVR) or visually through the use of a heads-up-display (HUD), Liquid Crystal Display (LCD) or Cathode Ray Tube (CRT). The information obtained from within the vehicle may also be used as input into a route selection and guidance system. Current efforts are focussing on the management and presentation of information to the motorist.

Table H.15 – Traveller Interface

TECHNOLOGY AREA: TRAVELLER INTERFACE

Traveller Interface ◕

Interactive traveller information provides tailored information in response to a traveller request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveller based on a submitted profile are supported. The traveller can obtain current information regarding traffic conditions, transit services, traveller services, ride share/ride match, parking management, and pricing information.

TECHNOLOGY AREA: TRAVELLER INTERFACE

A range of two-way wide-area wireless and wireline communications systems may be used to support the required digital communications between the traveller and the information service provider. A variety of interactive devices may be used by the traveller to access information prior to a trip or en-route, including telephone, pager, kiosk, Personal Digital Assistant, personal computer, and a variety of in-vehicle devices. Successful deployment of interactive traveller information relies on availability of real-time transportation data from roadway instrumentation, probe vehicles or other means.

Transit traveller information provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by transit traveller information.

Table H.16 – Operator Interface

TECHNOLOGY AREA: OPERATOR INTERFACE

Operator Interface ◕

There is a wide range of related industries (defence, sports media, etc.) that use control centre displays suitable for ITS. The size of the market drives the size of manufacturing base and results in wide range of products and competitive prices. The main technologies used in control centre applications are:

- front projection (CRT or LCD light valve);
- rear projection (CRT or LCD light valve);
- monitor wall;
- LED flat screen.

Front projection technology has found a limited implementation in ITS control centre applications. It does not provide adequate picture quality in office levels of illumination. In addition, a projector unit hanging from the ceiling may obstruct the view of the operators or other staff involved. However, new technology developments offer significant improvement in picture quality.

Rear projection technology is widely used to display high-resolution graphics and live video images. The technology is configurable in the sense that it is available in a variety of forms including:

- stand-alone pedestal mounted units marketed as standard products;

TECHNOLOGY AREA: OPERATOR INTERFACE

- standard products stackable rear-projection cubes which can be configured to suit custom display requirements;
- custom-built rear-projection wall using standard projector components into the facility.

CRT or light valve based rear-projection technology is proven, widely available and provides suitable intensity in office level illumination. The primary drawback for this technology is the space requirements to accommodate the systems.

Traditional ITS control rooms incorporate banks of monitors, or monitor walls to display live video images from surveillance cameras. The primary drawback of this display media is the inability to display large high-resolution graphic images across a wall of monitors. The current trend is towards a media-wall approach incorporating a matrix of integrated high resolution rear projection.

NAVIGATION

Navigation systems use technologies that determine absolute position, which in turn can be used to plot courses, etc. Examples include GPS and other systems which apply multi-lateration to known locations, either terrestrial or space based. Augmenting these technologies are those that measure travel path and distance (e.g., odometer, compass, gyroscope) from a known location. Very high-precision systems associated with vehicle control applications are one remaining research area.

Table H.17 – Navigation

TECHNOLOGY AREA: NAVIGATION

Route Selection and Guidance ●

A vehicle may be equipped with a route selection and guidance device or route selection and guidance information may be obtained from an Information Service Provider (ISP). Route selection and guidance can be either autonomous or dynamic.

Autonomous route selection and guidance relies on in-vehicle sensory, location determination, computational, map database and interactive driver interface equipment to enable planning and detailed route guidance based on static, stored information. Information is stored in a Geographic Information System (GIS) that analyses, stores, and displays both spatial and non-spatial data.

Dynamic navigation and guidance utilizes a dynamic GIS and is therefore responsive to current traffic, weather, and road conditions. ISP based route guidance is likely to utilize dynamic route selection and guidance technology. Future technical directions in this area focus on data fusion and system integration of data sources, communication service providers, and on-board equipment.

IN-VEHICLE SENSORS

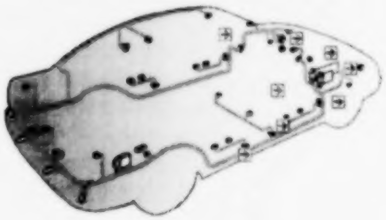
In-vehicle sensors encompass a broad range of on-board sensor technologies that monitor vehicle condition (e.g. engine, brake, tire, and suspension status) and performance (current speed, acceleration, yaw, traction, current steering, throttle, braking, and transmission status).

Table H.18 – In-Vehicle Sensors

TECHNOLOGY AREA: IN-VEHICLE SENSORS

In-Vehicle Sensors ●

The automotive industry has introduced a wide range of on-board vehicle sensors and diagnostics for engine management and dynamic stability. Sensors monitor parameters such as fluid levels/pressures, temperature, electrical current, etc. and initiate a response which may include control/actuation, visual signal or error code which identifies the fault condition. With the advent of the J-bus on-board communications networks, a variety of vehicle status information can be collected and reported to a centralized fleet management service using DSRC technology, interfaces at filling stations, or wide area communications.



COMMUNICATIONS

Many of the technologies described in this Appendix are identified as "Mature with Rapid Innovation". Of these technology areas, perhaps none is more crucial to the initial success and continued viability of ITS than communications.

Over the last two decades, a massive worldwide telecommunication infrastructure has evolved in the developed nations, both for wired and wireless communication. The reliability and capacity of wireline networks has increased exponentially, enabling a wide array of new services and capabilities. As performance has increased, prices of most wireline telecommunication services have dropped in most countries. At the same time, the wireless communications consumer market was born and has since witnessed unprecedented growth.

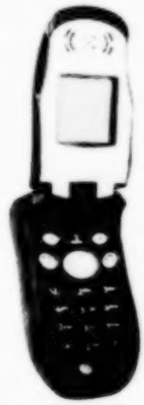
Over the next twenty years, many new communication technologies and techniques, from multiple access to transport to switching, will be introduced at a rapid pace to support the demands of our information age. Presently available and emerging technologies will offer extensive opportunities to handle many candidate ITS Services.

Table H.19 – Extended Range 2-Way Communications

TECHNOLOGY AREA: EXTENDED RANGE 2-WAY COMMUNICATIONS

Personal Communication Service (PCS) ●

Analogue cellular telephone service was launched in the U.S. in 1984 and in Canada in 1986. Its subscription growth has been rapid. In Canada the analogue cellular service is available to 93 % of the population and digital PCS service presently reaches over 40 % of the population, mainly in urban areas. By the end of 1999, cellular/PCS subscriptions reached over 6.5 million accounts. In the U.S. the subscription exceeds 70 million and the ratio of analogue to PCS should be the same as in Canada. It should be noted however that the growth of the 2G PCS is accelerating due to the range of digital service features, and performance of the service.



Analog: Analog cellular telephone service provides voice communications and some data capability to 14.8Kb/s. There are two organizations offering cellular services in Atlantic Canada – Aliant and Rogers AT&T. Both organizations offer cellular services across the country.

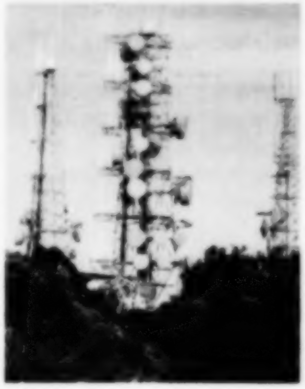
Digital: Several digital systems are available in the marketplace using Time Division Multiple Access (TDMA) or Code Division Multiple Access (CDMA) technology. The three systems deployed in Canada are CDMA ANSI-95B operated by Former Mobility Canada and by Clearnet, the TDMA ANSI-136 operated by Cantel and the TDMA PCS 1900(GSM) operated by Microcell. The digital systems are deployed in both the 2 GHz PCS and the 800 MHz cellular bands.

TECHNOLOGY AREA: EXTENDED RANGE 2-WAY COMMUNICATIONS

Enhanced Specialized Mobile Radio (ESMR) ◕

ESMR is a form of high mobility telephony and dispatch service that is offered using 2nd generation technology systems.

Microwave ●



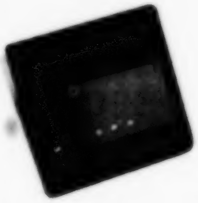
Microwave communication utilizes a number of microwave radios. Point-to point radios are connected in a serial trunk configuration, with repeater nodes connecting terminal ends. Access to a specific radio from any location is possible only through another radio, and access to a remote terminal is restricted to the one hop next to it. Repeater locations can be accessed from more than one spur direction in what is known as trunk and spur topology.

Wireless network links offer a low cost, high bandwidth alternative to a fibre network build. A network of microwave radios typically spans a large geographic area, and the network may connect to a wireline private network at various access points, or not at all.

Table H.20 – Dedicated Short Range Communications

TECHNOLOGY AREA: DEDICATED SHORT RANGE COMMUNICATIONS (DSRC)

Dedicated Short Range Communications (DSRC) ●



DSRC consists of wireless devices that are capable of transferring data at a high rate between mobile and/or stationary devices, but are limited to a short-range. At present, the most common application of DSRC within ITS is the communication of information between an in-vehicle transponder and a roadside antenna. This information may be used for electronic tolling, automatic vehicle location, device control, commercial vehicle operations, and traffic monitoring. However, future uses of DSRC are likely to include communication between vehicles, as well as communication between roadside devices. The 2-way communication capabilities of DSRC make it possible to use DSRC devices as a link between other wireless and wireline connections to build a complete communication network.

DSRC is a mature technology and has been widely used throughout Canada, and the world, for ITS initiatives. However, it has become apparent that there is a need to standardize DSRC and associated equipment, to provide a common path between the vehicles and devices which support ITS applications. The specific transmit/receive frequencies, as well as the communication protocols, are issues that need to be resolved for standardization. The following table presents a brief comparison of the emerging DSRC

TECHNOLOGY AREA: DEDICATED SHORT RANGE COMMUNICATIONS (DSRC)

standards in Japan, Europe, and North America.

Emerging DSRC Standards		
Region	Standard	Electromagnetic Spectrum
Japan		5.8 GHz active – A battery powered transponder receives and transmits in the 5.8 GHz frequency range
Europe	CEN-278	5.8 GHz passive backscatter – A transponder reflects transmissions in the 5.8 GHz frequency range.
North America	ASTM 6.0 / 7.0	900 MHz and 5.850-5.925 GHz active – A battery powered transponder receives and transmits in either the 900 MHz range, or the 5.8 GHz frequency range.

Table H.21 – Vehicle-to-Vehicle Communications

TECHNOLOGY AREA: VEHICLE-TO-VEHICLE COMMUNICATIONS

Vehicle to Vehicle Communications ◔

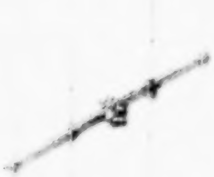
Vehicle-to-vehicle communications is one of the lesser-developed areas within ITS. Short-range, wireless communications is used to exchange information between vehicles in close proximity for applications such as intersection collision avoidance and vehicle platooning. Candidate communications technologies include dedicated RF, spread spectrum RF, and infrared. It is likely that the development of vehicle-to-vehicle communications technologies and standards will closely parallel the development of vehicle-to-infrastructure applications (i.e. DSRC).

Table H.22 – Broadcast Communications

TECHNOLOGY AREA: BROADCAST COMMUNICATIONS

Broadcast Communications ◕

Highway advisory radio (HAR) systems are the primary application of extended range broadcast communications within ITS. A licensed AM frequency (530-1700 kHz) or licensed FM frequency (88-108 MHz) may be used for extended range broadcast. The higher bandwidth of FM frequencies offers an improved signal, with a shorter range when compared to AM frequencies.



Digital Audio Broadcast (DAB) is a wireless audio and data transmission system developed for point-to-multipoint data broadcast applications. There are a number of ITS agencies world-wide that are considering applications that utilize DAB for traffic information broadcasting as well GPS system integration. Canadian broadcasters have adopted the Eureka 147 system and the CRTC has allocated L-Band frequency for this application. The U.S. is currently considering their own proprietary IBOC system for DAB transmission which would make use of the existing AM / FM frequency allocations. These potential

TECHNOLOGY AREA: BROADCAST COMMUNICATIONS

differences in spectrum allocation and communication protocol may lead to significant differences in the overall standards or requirements for any future DAB ITS applications.

Europe and Japan have recently embraced DAB, which provides a significant communications improvement over FM signal capabilities. DAB service is commencing in Canada; as nineteen radio stations in Toronto and nine in Montreal are broadcasting using DAB and receivers are readily available on the market. Commercial broadcasters are active in the DAB market, and a demonstration of ATIS services using DAB is planned for the Toronto area.

It will take time before a significant number of subscribers will embrace DAB services and it can be expected that for many years the simulcasting of the same programming on existing FM or AM stations and DAB will be required to reach audiences. Also, several years will be required for the expansion of DAB coverage outside main market areas.

It should be noted that Digital TV (DTV) under a common over the air standard is quickly being implemented in the U.S. DTV technology is based on ATM and each 6 MHz TV channel can provide up to 19Mb/s which can accommodate HDTV plus approximately 3 Mb/s of datacasting, or up to 4 TV programs of advanced formats, or a mixture of TV programs and datacasting. The Canadian Industry has greatly participated in the standards, the allotment plans, and the technology, to move towards the implementation of DTV. However, so far no firm commitment has been articulated as to when the industry will begin.

Table H.23 – Fixed Wireline Communications

TECHNOLOGY AREA: FIXED WIRELINE COMMUNICATIONS

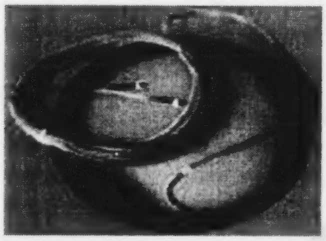
Fixed Wireline Communications ●

Dedicated and leased wireline communications wide area networks are used to integrate various ITS field components. Principal network design considerations include:

- The system must provide a high degree of reliability achieved through the use of components with a high mean time between failure, combined with a high level of redundancy in the network configuration;
- Capacity for system growth must be provided to accommodate the life of the system. Expansion is achieved through incorporation of spare fibres and a migration path for upgraded electronics;
- The system must be monitored for failures and loading using a central network management system;
- Standard industry communications protocols must be employed to minimize deployment, operations and maintenance costs.

In recent years there has been a movement away from proprietary communications architectures to industry standards such as Synchronous Optical Network (SONET) and Asynchronous Transfer Mode (ATM). As a result, there is a wide range of commercial products available for dedicated network and WAN/LAN network for ITS.

Synchronous Optical Network (SONET): SONET is a multiplexing standard for fibre-optic transmission systems. SONET was proposed by Bellcore in the mid-1980s and is now an ANSI standard. SONET defines interface standards at the physical layer of the OSI seven-layer model. The standard defines a hierarchy of interface rates that allow data streams at different rates to be multiplexed. SONET establishes Optical Carrier (OC) levels from 51.8 Mbps (about the same as a T-3 line) to 2.48 Gbps, as follows:



OC Level	Data Rate
OC-1	51.85 Mbps
OC-3	155.52Mbps
OC-12	622.08 Mbps
OC-24	1.244 Gbps
OC-48	2.488 Gbps

Prior rate standards used by different countries specified rates that were not compatible for multiplexing. With the implementation of SONET, communication carriers throughout the world can interconnect their existing digital carrier and fibre optic systems. The international equivalent of SONET, standardized by the ITU, is called Synchronous Digital Hierarchy (SDH).

TECHNOLOGY AREA: FIXED WIRELINE COMMUNICATIONS

Asynchronous Transfer Mode (ATM): Asynchronous Transfer Mode is a packetization standard which facilitates the transfer of data in cells or packets of a fixed size. The cell used with ATM is relatively small compared to units used with older technologies. The small, constant cell size allows ATM equipment to transmit video, audio, and computer data over the same network, and assure that no single type of data dominates the line bandwidth. Current implementations of ATM support data transfer rates of from 25 to 622 Mbps. This compares to a maximum of 100 Mbps for Ethernet, the current technology used for most LANs. ATM creates a virtual fixed channel, or route, between two points whenever data transfer begins.

The recent deregulation of the communications environment and the evolution of industry-wide standards have lead to opportunities for sharing communication networks. Partnerships can now be developed to defray initial fibre optic installation costs either through fibre for right of way, shared ownership, or leased communication services.

APPENDIX I

DEPLOYMENT PLANNING WORKSHOP

Atlantic Provinces - ITS Deployment Planning Workshop and ITS Capabilities Showcase
List of Registrants for April 25, 2002 and May 15, 2002

April 25, 2002 - ITS Deployment Workshop & ITS Capabilities Showcase, Westin Nova Scotian, Halifax

	First Name	Last Name	Company	Address	City	Province	PostalCode	BusinessPhone	Email Address
1	Glen	Davis	Council of Atlantic Premiers	P O Box 2044	Halifax	NS	B3J 2Z1	(902) 423-5377	gdavis@cmp.ca
2	Robert	Theriault	Royal Canadian Mounted Police	P O Box 3900	Fredericton	NB	E3B 4Z8	(506) 452-3312	bob.theriault@rcmp-grc.gc.ca
3	Shannon	Sanford	Department of Business New Brunswick	PO Box 6000	Fredericton	NB	E3B 5H1	(506) 444-5854	shannon.sanford@gnb.ca
4	David	Loukes	Geoplan Consultants Inc	919 Prospect Street	Fredericton	NB	E3B 2T7	(506) 451-0055	loukesd@geoplan.nb.ca
5	Dale	Thibodeau	Sunbury Transport Limited	P O Box 905, Stn "A"	Fredericton	NB	E3B 5B4	(506) 453-1133	thibodeau.dale@sunbury.ca
6	Steven	Snider	Halifax-Dartmouth Bridge Commission	P O Box 40	Dartmouth	NS	B2Y 3Y2	(902) 466-7691	swsnider@hdbc.ns.ca
7	Michael	Likely	Day & Ross Transportation Group	398 Main Street	Hartland	NB	E7P 1C6	(506) 375-5113	mblikely@dayrossgroup.com
8	Mac	MacLeod	Seimac Ltd	271 Browlow Ave	Dartmouth	NS	B3B 1W6	(902) 468-3007 x210	mmacleod@seimac.com
9	Kelly	Lunn	Seimac Ltd	271 Browlow Ave	Dartmouth	NS	B3B 1W6	(902) 468-3007 x253	klunn@seimac.com
10	Bernadette	Allen	Future Learning Inc	25 Queen Street, Suite 23	Charlottetown	PE	C1A 4A2	(902) 892-2999	ballen@futurelearning.com
11	Terry	Allen	Future Learning Inc	25 Queen Street, Suite 23	Charlottetown	PE	C1A 4A2	(902) 892-2999	tallen@futurelearning.com
12	Ralph	Boyd	Atlantic Provinces Trucking Association	407 Dieppe Blvd	Dieppe	NB	E1A 6P8	(506) 855-2782	rboyd@apta.ca
13	Ed	Peterson	Department of Public Safety New Brunswick	364 Argyle Place, P O Box 6000	Fredericton	NB	E3B 5H1	(506) 444-4670	edgar.peterson@gnb.ca
14	Brian	Taylor	Halifax Regional Municipality - Metro Transit	200 Ilsley Ave	Dartmouth	NS	B3B 1V1	(902) 490-6608	taylor@region.halifax.ns.ca
15	David	McCusker	Halifax Regional Municipality	PO Box 1749	Halifax	NS	B3J 3A5	(902) 490-6696	mccuskd@region.halifax.ca
16	Dave	Macfarlane	New Brunswick Department of Transportation	PO Box 6000	Fredericton	NB	E3B 5H1	(506) 453-2600	Dave.Macfarlane@gnb.ca
17	Douglas	Colwell	DFC Consulting Ltd	39 Foley Court	Fredericton	NB	E3B 2R8	(506) 455-5353	dougcol@nb.sympatico.ca
18	Leo	MacPherson	Aliant Telecom	3-North, 1505 Barrington Street	Halifax	NS	B3J 2W3	(902) 487-2432	leo.macpherson@aliant.ca
19	Ronald	Furlong	MHCC - Small Business Committee - Future Growth Subcommittee	P O Box 29099	Halifax	NS	B3L 4T8	(902) 477-8020	rfurlong@istar.ca
20	Jim	Nicoll	Halifax Port Authority	P O Box 336	Halifax	NS	B3J 2P6	(902) 426-8713	jnicoll@portofhalifax.ca
21	Daryell	Nowlan	Atlantic Canada Opportunities Agency (ACOA)	570 Queen Street PO Box 578	Fredericton	NB	E3B 5A6	(506) 452-3104	dnowlan@acoa-apeca.gc.ca
22	Harold	Hefferton	Transport Canada					(709) 772-2586	heffern@tc.gc.ca
23	Michael	Zinck	Atlantic Canada Opportunities Agency (ACOA)	60 Queen Street, 4th Floor	Ottawa	ON		(613) 952-9106	mzinck@acoa-apeca.gc.ca
24	Tony	Lamport	Office of Economic Development	World Trade Centre, P O Box 519	Halifax	NS	B3L 3E6	(902) 424-6805	tlamport@gov.ns.ca
25	Kent	Speiran	Nova Scotia Department of Transportation and Public Works	P O Box 186	Halifax	NS	B3J 2N2	(902) 424-3510	speirakd@gov.ns.ca
26	Jill	MacDow	Nova Scotia Department of Transportation and Public Works	Purdys Wharf Tower II, 1969 Upper Water Street	Halifax	NS	B3J 3R7	(902) 424-2851	macdowj@gov.ns.ca

May 15, 2002 - ITS Deployment Workshop & ITS Capabilities Showcase, Delta St. John's Hotel & Conference Centre

	First Name	Last Name	Company	Address	City	Province	PostalCode	BusinessPhone	Email Address
1	Cluney	Mercer	Newfoundland Department of Works, Services and Transportation	P O Box 8700	St John's	NF	A1B 4J6	(709) 729-6321	mercercg@gov.nf.ca
2	Dave	Macfarlane	New Brunswick Department of Transportation	PO Box 6000	Fredericton	NB	E3B 5H1	(506) 453-2600	Dave.Macfarlane@gnb.ca
3	Gary	Gosse	Government of Newfoundland & Labrador	6th Floor, Confederation Building, West Block	St John's	NF	A1B 4J6	(709) 729-3796	gosseg@mail.gov.nf.ca
4	Daryell	Nowlan	Atlantic Canada Opportunities Agency (ACOA)	570 Queen Street PO Box 578	Fredericton	NB	E3B 5A6	(506) 452-3104	dnowlan@acoa-apeca.gc.ca
5	Mark	Gourley	Atlantic Canada Opportunities Agency (ACOA)	644 Main Street, 3rd Floor	Moncton	NB	E1C 9J8	(506) 851-6078	mgourley@acoa-apeca.gc.ca
7	Peter	Hood	Transport Canada	P O Box 1300, 10 Barter's Hill	St John's	NF	A1C 6H9	(709) 772-6099	hoodp@tc.gc.ca
8	Jill	St George	St John's Transportation Commission	Metrobus Transit Centre, 245 Freshwater Rd	St John's	NF	A1B 1B3	(709) 570-2070	jill@metrobus.com
9	Janet	Bradshaw	St John's Transportation Commission	Metrobus Transit Centre, 245 Freshwater Rd	St John's	NF	A1B 1B3	(709) 570-2130	janetb@metrobus.com
??	Angus	Armour	Called to say he has to check if he can attend this one Apr. 18/02						
10	Ernest	Reimer	CanPolar East Inc	702 Water Street	St John's	NL	A1B 1C1	(709) 722-6067	ereimer@cagnpolar.com
11	Robin	King	City of St. John's	City Hall, 10 New Gower Street, 3rd Floor	St John's	NF	A1C 5M2	(709) 576-8232	rking@city.st-johns.nf.ca
12	Barry	Humby	Aliant Telecom	P O Box 2110	St John's	NF	A1C 5H6	(709) 739-3167	barry.humby@aliant.ca
13	Bernie	Molloy	Aliant Telecom	4th Floor, FWB	St John's	NF	A1C 5H6	(709) 758-6323	bernie.molloy@aliant.ca
14	Patricia	Byrne	Aliant Telecom	4th Floor, FWB	St John's	NF	A1C 5H6	(709) 758-6320	patricia.byrne@aliant.ca
15	Bill	MacDonald	City of St John's	P O Box 908	St John's	NF	A1C 5M2	(709) 576-6125	bmacdonald@city.st-johns.nf.ca
16	Michelle	Brophy	Stratos			NF		709-748-4286	michelle_brophy@stratosglobal.com

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April 25, 2002

ATLANTIC PROVINCES
REGIONAL ITS STRATEGIC PLANNING STUDY
DEPLOYMENT PLANNING WORKSHOP
And
SHOWCASE/PRESENTATIONS

APRIL 25, 2002
THE WESTIN NOVA SCOTIAN HOTEL
1181 HOLLIS STREET
HALIFAX, NOVA SCOTIA

DRAFT AGENDA

Sign-in and Refreshments (30 minutes) (8:00 a.m. – 8:30 a.m.)

Introductory Session (90 minutes) (8:30 a.m. – 9:30 a.m.)

OBJECTIVE: to prepare participants to provide input on the deployment plan, and build on the work performed during the its opportunities workshop

Activities:

Introduction:

- Welcome and Opening Remarks
- Introduction of Facilitators and Advisors
- Introduction of Participants
- Objectives of the workshop

ITS Planning Study Overview:

- Description of Strategic Plan Development Process
- Description of Results of the ITS Opportunities Workshop
- Presentation of Project Prospecti

Break (15 minutes) (9:30 a.m. – 9:45 a.m.)

Project Prospecti Assessment (30 minutes) (9:45 a.m. - 10:15 a.m.)

Objective: to provide input on the Project Prospecti

Activities:

Project Prospecti Assessments:

- Consultant team provides two page summaries defining proposed projects
- Participants divided into groups of five, based on their interests in particular projects
- Group exercise – participants to review the project outlines, and provide input on the contents

Presentation of Results (30 minutes) (10:15 a.m. – 10:45 a.m.)

Informal Presentations:
- Group leaders to present highlights of their discussions

Break (15 minutes) (10:45 a.m. – 11:00 a.m.)

Deployment Planning (60 minutes) (11:00 a.m. – noon)

Objective: to obtain input on the deployment program through a scheduling exercise

Activities:

- Consultant team provides and manages a large scale GANTT chart
- Consultant team facilitates a group exercise to schedule the deployment of the "early winners", followed by the deployment of the higher priority user services

Closing (5 minutes)
- Next Steps

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May 15, 2002

ATLANTIC PROVINCES
REGIONAL ITS STRATEGIC PLANNING STUDY

DEPLOYMENT PLANNING WORKSHOP

MAY 15, 2002
THE DELTA ST. JOHN'S HOTEL & CONFERENCE CENTRE
120 NEW GOWER STREET
ST. JOHN'S, NEWFOUNDLAND

AGENDA

Introductory Session (45 minutes) (1:30 p.m. – 2:15 p.m.)

Objective: to prepare participants to provide input on the deployment plan, and build on the work performed during the ITS Opportunities Workshop

Activities:

Introduction:
- Welcome and Opening Remarks
- Introduction of Facilitators and Advisors
- Introduction of Participants
    - Objectives of the workshop

ITS Planning Study Overview:
- Description of Strategic Plan Development Process
- Description of Results of the ITS Opportunities Workshop
- Presentation of Project Profiles

Break (15 minutes) (2:15 p.m. – 2:30 p.m.)

Project Profiles Assessment (60 minutes) (2:30 p.m. - 3:30 p.m.)

Objective: to provide input on the project profiles

Activities:

Project Profile Assessments:
- Consultant team provides two page summaries defining proposed projects
- Participants divided into groups of five, based on their interests in particular projects
- Group exercise – participants to review the project outlines, and provide input on the contents

Break (15 minutes) (3:30 p.m. – 3:45 p.m.)

Presentation of Results (30 minutes) (3:45 p.m. – 4:45 p.m.)

Informal Presentations:

- Group leaders to present highlights of their discussions

Closing (15 minutes) (4:45 p.m. – 5:00 p.m.)

PROPOSED PROJECT PROSPECTUS

INDEX

PROJECT NUMBER	PROJECT NAME
TI-1	Atlantic Provinces Advanced Traveler Information System
TI-2	Atlantic Canada Transportation Network Information Warehouse
TI-3	Atlantic Provinces Tourist Reservation System
TM-1	Atlantic Provinces ARWIS Expansion
TM-2	Wildlife Detection in New Brunswick, Scoping Study and Pilot Project
TM-3	Implementation of Fixed Automated Spray Technology (FAST) for Bridge De-icing
TM-4	Atlantic Red Light Camera Pilot Project
TM-5	Portable Changeable Message Sign (PCMS) for Work Zones
TM-6	Smart Snowplow Expansion
TM-7	Halifax Bridge Incident Management Scoping Study
PT-1	Halifax Transit Real-Time Information Service
PT-2	PEI Community Transit
EP-1	Saint John Parking Commission, Parking Electronic Payment/Monitoring
EP-2	Atlantic Canada Transaction Tag
EP-3	St. John's Smart Card Pilot Project
CV-1	Newfoundland Integrated Information System (WIM)
CV-2	New Brunswick Electronic Inspection
CV-3	New Brunswick Border Crossing
CV-4	New Brunswick Border Security
CV-5	New Brunswick Electronic Permitting for Oversized and Overweight Vehicles
CV-6	Port of Halifax Operational Information Extranet
CV-7	Port of Halifax Container Security
CV-8	Halifax Airport Groundside Transportation Management
CV-9	Commercial Fleet Management Program
EM-1	Wireless Network Expansion
EM-2	Atlantic Provinces Disaster Response Plan Scoping Study

APPENDIX J

Glossary of Terms

Appendix J – Glossary of Terms

AVL (Automatic Vehicle Location) – AVL refers to the use of spatial-recognition technology to identify communicate the location of a fleet of vehicle. This can boost dispatch efficiency and service reliability.

CMS (Changeable Message Signs) – Changeable Message Signs are used to provide drivers with up-to-date information on congestion levels, road closures, etc.

Geomatics - Geomatics encompasses the science, technology and management of geographically referenced information, including its acquisition, storage, analysis, processing, display and dissemination.

GIS (Geographic Information Systems) - GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information, i.e. data identified according to their locations.

GPS (Global Positioning System) – GPS is a system whereby a network of satellites is used to locate the longitude, latitude and altitude of the receiver. A minimum of three satellites must be in the scope of the receiver to function, with increasing accuracy as more satellites come into view.

Market Packages – Market packages refers to a group of pieces from the ITS Architecture required to implement a service.

PCMS (Portable Changeable Message Signs) – PCMS are most commonly used at construction sites to provide drivers with up-to-date information on congestion levels, road closures, etc.

RWIS (Road Weather Information Systems) – Monitors current road and weather conditions using a combination of weather service information and data collected from environmental sensors deployed on and about the roadway. The collected road weather information is monitored and analysed to detect and forecast environmental hazards. This information can be used to more effectively deploy road maintenance resources, issue general traveller advisories, improve emergency management and response, and support location specific warnings to drivers.

SCOOT (Split Cycle Offset Optimization Technique) – SCOOT is a traffic control system that uses traffic adaptive control. Under traffic adaptive control, the system continuously monitors traffic flow and optimizes traffic signal operation based on an on-line traffic flow model.

User Services – User services document what ITS should do from the user's perspective. A broad range of users are considered, including the traveling public as well as many different types of system operators. The concept of user services allows system or project definition to begin by establishing the high level services that will be provided to address identified problems and needs. Some examples of user services from the Canadian ITS Architecture are: Incident Management, En-Route Transit Information, Intermodal Freight Management, etc.

User Service Bundles – The bundles are a logical grouping of user services that provides a convenient way to discuss the range of requirements in a broad stakeholder area. Examples include: Traffic Management Services, Commercial Vehicle Operations, etc.

User Sub-Services – User Services and User Sub-Services represent what the system will do from the perspective of the user. A user might be the public or a system operator.

WIM (Weigh-in-Motion) – WIM is a sensory technology that is capable of measuring the weight of a vehicle (typically used for Commercial Vehicle Operations) while in motion, thus saving the vehicle time and eliminating possible resulting congestion.

APPENDIX K

Roundtable Participants

Appendix K – Roundtable Participants

Firm/Agency	Province	Address	Contact	Phone	Fax	e-mail	Player Type
Business New Brunswick - Knowledge Industry & Technology	NB	Centennial Bldg, PO Box 6000, King St, Fredericton E3B 5H1	Len Weeks, Manager	506-453-4845	506-453-2727	len.weeks@gnb.ca	Facilitator
CARIS Universal Systems	NB	264 Rookwood Ave., Fredericton NB E3B 2M2	Heather MacLean	506-459-3849	506-458-8533	info@caris.ca	Provider/GIS
J.D. Irving*	NB	300 Union Street, P.O. Box 5777, Saint John, NB E2L 4M3	Robert Youden, VP Irving Transportation Services	506-632-5150	506-633-5540	youden.bob@jdirving.com	User
University of New Brunswick - Transportation Group	NB	Head Hall, Room D126, P.O. Box 4400 Fredericton, NB E3B 5A3	Eric Hildebrand	506447-3440	506-452-6229	edh@unb.ca	Researcher
Approach Navigation System	NB	409 Dieppe Blvd., Dieppe NB E1A 6P9	Eric Gionet	506-854-0030	506-854-2967	bahern@approach.nb.ca	Provider
New Brunswick Community College - Dieppe	NB	505 College Street, Dieppe, NB, E1A 6X2	Raymond Dufour, Instructor Business Technology Transportation	506-856-2125	506-856-2201	raymond.dufour@gnb.ca	Researcher
Instrumar Limited	NF	PO Box 13246 St. A, 39 Pippy Place, 3rd Floor, St. John's NF A1B 4A5	Michael Chan	709-726-8613	709-726-8460	michael.chan@instrumar.com	Provider (integrator)
Aliant Inc. - NewTel Communications & Public Affairs	NF	PO Box 2110, St. John's A1C 5H6	Lloyd Little	709-739-2099	709-739-2183	lloyd.little@aliant.ca	Provider (integrator)
Newfoundland & Labrador Department of Industry, Trade & Rural Development - Information Services	NF	Newfoundland & Labrador Department of Industry, Trade & Rural Development - Information Services	Robert Parsons	709-729-4819	709-729-4869	tsummers@gov.nf.ca	Facilitator
Halifax-Dartmouth Bridge Commission	**NS**	**Administration Building, Wyse Rd, PO Box 40, Dartmouth B2Y 3Y2**	**Steve Snider, General Manager**	**902-469-6261**	**902-463-2800**	**bridges@hdbc.ns.ca**	**Owner**
Seimac Limited	NS	271 Brownlow Ave., Dartmouth NS B3B 1W6	Mac McCloud	902-468-3007 x210	902-468-3009	mmacleod@seimac.com	Provider (integrator)
Halifax Regional Municipality - Traffic and Transportation	NS	PO Box 1749, Halifax B3J 3A5	David Mc Cusker, Manager	902-490-6904	902-490-6696	mccuskd@region.halifax.ns.ca	Owner
Halifax Port Authority	**NS**	**1215 Marginal Rd, PO Box 336, Halifax B3J 2P6**	**Jim Nicoll**	**902-426-7335**	**902-426-3643**	**dbelle@portofhalifax.ca**	**User**
Metocean	NS	21 Thornhill Drive, Dartmouth NS B3B 1R9		902-468-4442	902-468-2505	webmfr@meteocean.com	Provider (integrator)
Confederation Bridge	PE	104 Abegweit Boul, PO Box 2032, Borden-Carleton C0B 1X0	John Francis	902-437-7342	902-437-7321	johnf@scbl.net	Owner
Baseline Business Geographics	PE	PO Box 123, 209 Queen St., suite 205, Charlottetown PEI C1A 7K2	Frank MacEachern, President	902-628-0300	877-351-2244 902-892-0300	frankm@baselinegeo.com	Researcher
DeltaWare Systems Inc.	PE	535 North River Road, Charlottetown PE C1E 1J6	Ed Lawlor	902-628-4660	902-368-8122	elawlor@deltaware.com	Provider (software)

LEGEND	Number
Public Sector	6
Private Sector	8
Academic	1
Other	**2**

* Alternate Contacts: Dale Thibodeau, Sunbury
Mike Likely, Day & Ross

APPENDIX L

ITS Enabling Technologies Associated with Profiled ITS-Capable Companies

Appendix L – ITS Enabling Technologies Associated with Profiled ITS-Capable Companies

Company	Sensing, monitoring, surveillance and, data-logging	Position determination, tracking, navigation, routing	Control systems	User interfaces	Electronic payment	Information communication, management, analysis	Consulting
Accesstec Inc.						*	
ADI Group							*
Advatek Systems Inc	*	*				*	
ALT Group Inc						*	
AMIRIX Systems Inc.	*					*	
AnyWare Group Inc.					*	*	
Approach Navigation Systems Inc.	*	*				*	
Atlantic Data Group	*					*	
Baseline Business Geographics Inc.						*	
Beltek Systems Design Inc.						*	
Canpolar East Inc.	*					*	
CARIS		*				*	
Centre for Education and Research in Safety							*
C-CORE	*					*	
Compusult Limited		*				*	
Consolidated Technologies Inc.	*					*	
DPL Group		*				*	
Delphi Systems							*
DPL Group	*	*				*	
Engineering Technologies Canada Ltd.	*			*		*	
Enseignes Imperial Signs			*				*
GeoNet Technologies Inc.						*	
Geoplan Consultants Inc.						*	
International Communications and Navigation Ltd.	*	*				*	
Intrignia Solutions Inc.			*			*	
Jacques Whitford Environment							*
J.J. Mackay Canada Limited				*	*	*	
Kinek Ltd.						*	
Measurand Inc.	*						
PEI Innovations Inc.	*					*	
Pintér Consulting						*	*
Satlantic Inc.	*		*			*	
Seimac Limited	*	*				*	
SGE Group Inc.						*	*
Spatial Decision Support Systems						*	*
SVG Consulting Inc.							*
Trip Data & Safety Management Inc.						*	
xwave		*	*		*	*	

APPENDIX M

Atlantic Provinces ITS Company Profiles

Accesstec Inc. 1

COORDINATES

Head Office: Fredericton NB

Mailing Address: 590 Brunswick Street
Fredericton, NB
E3B 1H5

Telephone: 506-452-9780
Facsimile: 506-450-1103
Internet: www.accesstec.ca

PRESENCE IN ATLANTIC CANADA

Years in operation:	7
Number of Employees:	27
Employees in Atlantic Region:	75%

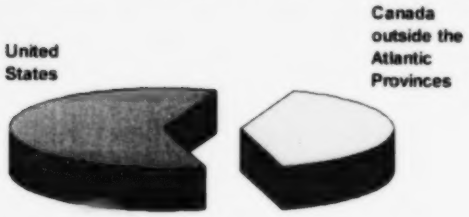
PRINCIPAL ACTIVITIES

- Product development, systems integration, e-learning, and related consulting services.

PRODUCTS/SERVICES RELATED TO ITS

- Wireless parking management systems. Handheld units allow parking officers to access vehicle information (including parking violations) and parking meter history.
- Potential expansion to include on-board systems such as those used by police officers to access moving violation and other information.

MARKET GEOGRAPHY



ADI Group 2

COORDINATES

Head Office: Fredericton NB

Mailing Address: 1133 Regent Street, Suite 300
Fredericton, NB
E3B 3Z2

Telephone: 506-452-9000
Facsimile: 506-459-3954
Internet: www.adi.ca

PRESENCE IN ATLANTIC CANADA

Years in operation:	46
Number of Employees:	200
Employees in Atlantic Region:	90%

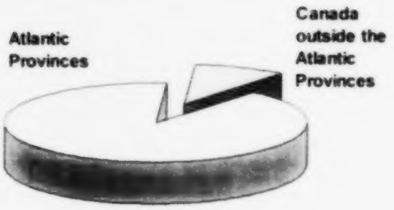
PRINCIPAL ACTIVITIES

- Consulting engineering services.

PRODUCTS/SERVICES RELATED TO ITS

- ITS planning.
- Traffic control systems planning/installation, planning of information centres and wayfinding systems, public transit routing and monitoring, network modelling and simulation, border crossing planning and evaluation.

MARKET GEOGRAPHY



Advatek Systems Inc. 3

COORDINATES

Head Office:	Moncton NB
Mailing Address:	P.O. Box 966 Moncton NB E1C 8N8
Telephone:	506-857-0909
Facsimile:	506-858-9271
Internet:	

PRODUCTS/SERVICES RELATED TO ITS

- Radio frequency-based ID tag and bar code scanning and monitoring for tracking and data collection
- Weigh-scales; currently static but could adapt to weigh-in-motion

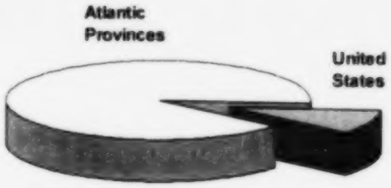
PRESENCE IN ATLANTIC CANADA

Years in operation:	15
Number of Employees:	8
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Product development, system integration, manufacturing, and related consulting services.

MARKET GEOGRAPHY



ALT Group Inc. 4

COORDINATES

Head Office:	Miramichi NB
Mailing Address:	PO Box 185 Miramichi, NB E1N 3A6
Telephone:	506-773-9203
Facsimile:	506-773-4645
Internet:	www.altgroupinc.com

PRODUCTS/SERVICES RELATED TO ITS

- efueltax.com internet-based reporting and filing system for IFTA fuel tax, using PDA's for data input.
- Potential expansion of efueltax.com system (with appropriate components) to incorporate other fleet management functions.

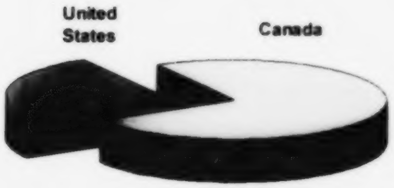
PRESENCE IN ATLANTIC CANADA

Years in operation:	6
Number of Employees:	8-10
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Product development (software) and related consulting services.

MARKET GEOGRAPHY



AMIRIX Systems Inc. 5

COORDINATES

Head Office:	Halifax NS
Mailing Address:	77 Chain Lake Drive Halifax, NS B3S 1E1
Telephone:	902-450-1700
Facsimile:	902-450-1704
Internet:	www.amirix.com

PRODUCTS/SERVICES RELATED TO ITS

- RF-based asset identification and tracking system.
- Custom embedded hardware systems and related software.

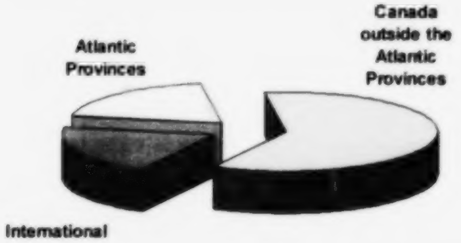
PRESENCE IN ATLANTIC CANADA

Years in operation:	21
Number of Employees:	50
Employees in Atlantic Region:	97%

PRINCIPAL ACTIVITIES

- Product development (software and hardware), systems integration, and research.

MARKET GEOGRAPHY



AnyWare Group Inc. 6

COORDINATES

Head Office:	Saint John NB
Mailing Address:	15 Market Square, Suite 1602 Saint John, NB E2L 1E8
Telephone:	506-643-6600
Facsimile:	506-643-6605
Internet:	www.anywaregroup.com

PRODUCTS/SERVICES RELATED TO ITS

- Billing engine and related account management system that operates either with a transponder or a smart card and uses a wireless data communications network.
- Billing engine/accounts management system is applicable to toll roads, public transit and ferry services, fuel purchases, traveller reservation systems, and other electronic payment situations.

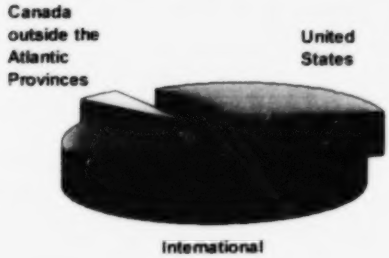
PRESENCE IN ATLANTIC CANADA

Years in operation:	2
Number of Employees:	25
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Product development (software), systems integration, consulting, training.

MARKET GEOGRAPHY



Approach Navigation Systems Inc. 7

COORDINATES

Head Office:	Dieppe NB
Mailing Address:	409 Dieppe Boulevard Dieppe, NB E1A 6P8
Telephone:	506-854-2967
Facsimile:	506-854-0030
Internet:	www.approach.nb.ca

PRODUCTS/SERVICES RELATED TO ITS

- Road weather information systems (RWIS). Have installed 8 RWIS systems in Nova Scotia, with a contract for 16 more.
- GPS-based air navigation systems and related telecommunications systems potentially adaptable to monitoring and dynamic control of ground maintenance operations (e.g. snow removal).

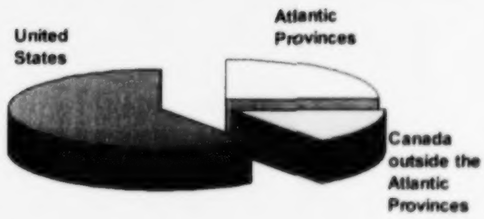
PRESENCE IN ATLANTIC CANADA

Years in operation:	6
Number of Employees:	6
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Product development (software), assembly, systems integration, installation and servicing, consulting, and quality assurance.

MARKET GEOGRAPHY



Atlantic Data Group 8

COORDINATES

Head Office:	Halifax NS
Mailing Address:	6025 North Street Halifax, NS B3K 1N9
Telephone:	902-423-6889
Facsimile:	902-455-5189
Internet:	www.eagleeyedvr.com

PRODUCTS/SERVICES RELATED TO ITS

- Intelligent remote video surveillance monitoring and motion detection based on a digital video recorder. Facial recognition capabilities.
- Video surveillance system with facial recognition capabilities is applicable to passenger security systems, border security systems, and other similar applications.

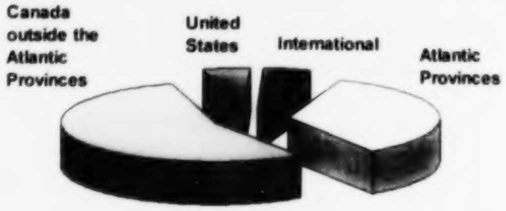
PRESENCE IN ATLANTIC CANADA

Years in operation:	25
Number of Employees:	25
Employees in Atlantic Region:	90%

PRINCIPAL ACTIVITIES

- Product development, system integration, installation and servicing, and training.

MARKET GEOGRAPHY



Baseline Business Geographics Inc.

9

COORDINATES

Head Office:	Charlottetown PEI
Mailing Address:	PO Box 123 Charlottetown, PEI C1A 7K2
Telephone:	902-892-0030
Facsimile:	902-628-0300
Internet:	www.baselinegeo.com

PRESENCE IN ATLANTIC CANADA

Years in operation:	8
Number of Employees:	5
Employees in Atlantic Region:	100%

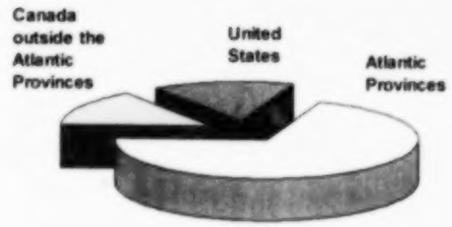
PRINCIPAL ACTIVITIES

- Product development (software), systems integration, training, and related consulting services.

PRODUCTS/SERVICES RELATED TO ITS

- RF propagation modelling and network planning using GIS tools.
- Existing paratransit transportation scheduling system could serve as basis for real-time transit routing/navigation or delivery routing systems.

MARKET GEOGRAPHY



Beltek Systems Design Inc.

10

COORDINATES

Head Office:	Dieppe NB
Mailing Address:	884 Champlain Avenue Dieppe, NB E1A 1P7
Telephone:	506-857-4196
Facsimile:	506-857-0194
Internet:	www.beltek.com

PRESENCE IN ATLANTIC CANADA

Years in operation:	12
Number of Employees:	20
Employees in Atlantic Region:	90%

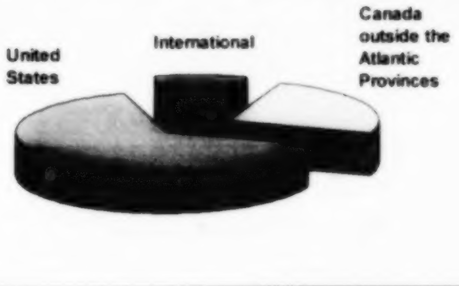
PRINCIPAL ACTIVITIES

Product development (software), systems integration, and related consulting services.

PRODUCTS/SERVICES RELATED TO ITS

- Commercial delivery vehicle route accounting and invoicing using handheld PC's.
- Commercial vehicle safety monitoring (driver hours).
- Potential expansion to other fleet management functions.
- Possible enhancement to provide wireless operation when coverage permits.

MARKET GEOGRAPHY



Canpolar East Inc. 11

COORDINATES

Head Office: St. John's NFLD & LAB

Mailing Address: 702 Water Street
St. John's, NFLD & LAB
A1E 1C1

Telephone: 709-722-6067
Facsimile: 709-722-1138
Internet: www.canpolar.com

PRODUCTS/SERVICES RELATED TO ITS

- Post-contact crash sensors and occupant sensors for the automobile industry. Collaboration with major auto manufacturers.
- Potential application to rural "mayday" and other emergency notification systems.

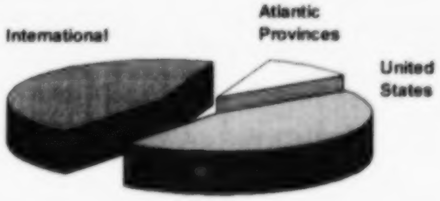
PRESENCE IN ATLANTIC CANADA

Years in operation:	20
Number of Employees:	1
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Product development (hardware).

MARKET GEOGRAPHY



CARIS 12

COORDINATES

Head Office: Fredericton NB

Mailing Address: 264 Rookwood Avenue
Frederictoni, NB
E3B 2M2

Telephone: 506-773-9203
Facsimile: 506-773-4645
Internet: www.altgroupinc.com

PRODUCTS/SERVICES RELATED TO ITS

- GIS/GPS-based:
  - automatic vehicle location
  - asset tracking
  - routing
  - navigation.
- Potential enhancements to existing applications, possibly real-time operation.

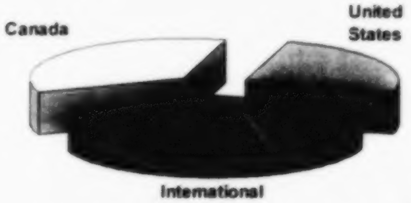
PRESENCE IN ATLANTIC CANADA

Years in operation:	22
Number of Employees:	150
Employees in Atlantic Region:	80%

PRINCIPAL ACTIVITIES

- Product development (software) and related consulting services.

MARKET GEOGRAPHY



C-CORE

13

COORDINATES

Head Office: St. John's NFLD &LAB

Mailing Address: Cptn Robert A. Bartlett
Bldg
Morrisey Road
St. John's, NFLD & LAB
A1B 3X5
Telephone: 709-737-8354
Facsimile: 709-737-4706

PRODUCTS/SERVICES RELATED TO ITS

- Remote ground movement sensing and security monitoring (for pipelines).
- Potential adaptation to transportation systems monitoring.
- Potential adaptation to transportation vehicle/facility security monitoring.

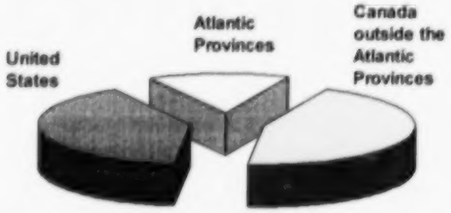
PRESENCE IN ATLANTIC CANADA

Years in operation:	27
Number of Employees:	57
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Product research and development and related consulting.

MARKET GEOGRAPHY



Centre for Education and Research in Safety

14

COORDINATES

Head Office: Shediac NB

Mailing Address: PO Box 5221
Shediac NB
E4P 8T9

Telephone: 506-532-2501
Facsimile: 506-532-1453
Internet: www.cers-safety.com

PRODUCTS/SERVICES RELATED TO ITS

- Human factors analysis
- Enforcement programs
- Signage and signals research, development and design

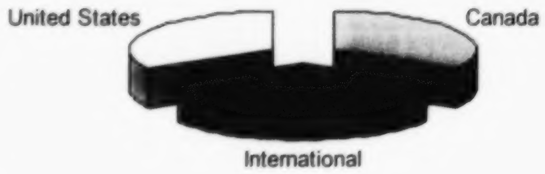
PRESENCE IN ATLANTIC CANADA

Years in operation:	13
Number of Employees:	2
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Development of programs to reduce collisions and improve the safety related behaviour of motorists, cyclists, and pedestrians

MARKET GEOGRAPHY



Compusult Ltd. 15

COORDINATES

Head Office:	Mount Pearl NFLD & LAB
Mailing Address:	P.O. Box 1000 Mount Pearl NFLD & LAB A1N 3C9
Telephone:	709-745-7914
Facsimile:	709-745-7927
Internet:	www.compusult.nf.ca

PRODUCTS/SERVICES RELATED TO ITS

- Asset tracking software (e.g. for containers) using bar code scanning or RF tag identification.
- Data mining and data warehousing.

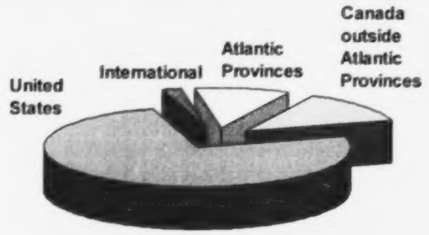
PRESENCE IN ATLANTIC CANADA

Years in operation:	17
Number of Employees:	32
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Product development, system integration, and related consulting services.

MARKET GEOGRAPHY



Consolidated Technologies Ltd. 16

COORDINATES

Head Office:	St. John's NF & LA
Mailing Address:	37 Stavenger Drive St. John's, NF A1A 5E8
Telephone:	709-576-0748
Facsimile:	709-576-0746
Internet:	www.contechnav.com

PRODUCTS/SERVICES RELATED TO ITS

- Embedded custom data interfaces (hardware and software) between systems, including data logging and sensors. Toolbox for system integrators.
- Primarily marine-related but some land-based systems.
- Adaptable to a range of ITS applications

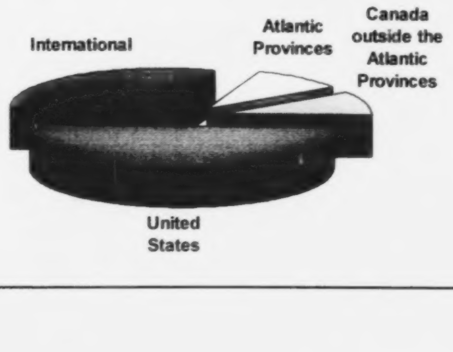
PRESENCE IN ATLANTIC CANADA

Years in operation:	17
Number of Employees:	8
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Product development, manufacturing, research, and related consulting services.

MARKET GEOGRAPHY



Delphi Systems Inc

17

COORDINATES

Head Office:	Scotsburn NS
Mailing Address:	P.O. Box 362 Scotsburn, NS B0K 1R0
Telephone:	902-485-2222
Facsimile:	902-485-2121
Internet:	www.delphi-

PRESENCE IN ATLANTIC CANADA

Years in operation:	9
Number of Employees:	5
Employees in Atlantic Region:	40%

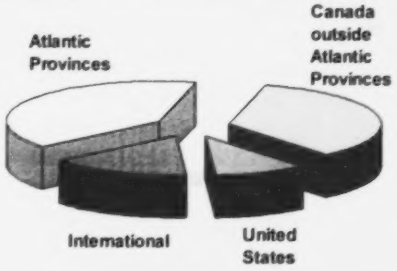
PRINCIPAL ACTIVITIES

- Consulting and training services.

PRODUCTS/SERVICES RELATED TO ITS

- ITS planning, evaluation, training.
- ITS strategic plan for Canada, Planning for an ITS Industrial Base.

MARKET GEOGRAPHY



DPL Group

18

COORDINATES

Head Office:	Saint John NB
Mailing Address:	1216 Sand Cove Road Saint John, NB E2M 5V8
Telephone:	506-635-1055
Facsimile:	506-635-1057
Internet:	www.dpl.ca

PRESENCE IN ATLANTIC CANADA

Years in operation:	17
Number of Employees:	80
Employees in Atlantic Region:	100%

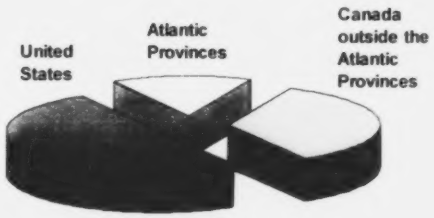
PRINCIPAL ACTIVITIES

- Product development, system integration, manufacturing, set-up.

PRODUCTS/SERVICES RELATED TO ITS

- Asset location and tracking, including vehicles.
- Engine/vehicle status monitoring.
- Remote data monitoring and retrieval using cellemetry and the internet.
- Potential enhancement of existing systems to include real-time monitoring and fleet management capabilities.

MARKET GEOGRAPHY



Engineering Technologies Canada Ltd. 19

COORDINATES

Head Office: Charlottetown PEI

Mailing Address: 24 Humphrey Drive
Charlottetown, PEI
C1B 1K2

Telephone: 902-628-1705
Facsimile: 902-628-1703
Internet: www.engtech.ca

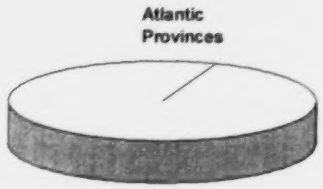
PRODUCTS/SERVICES RELATED TO ITS

- Intelligent sensor and data-logging micro-electronics.
- Consulting on kiosks, LCD touch-screens, and other user interfaces.
- Custom micro-electronics adaptable according to requirements.
- Adaptable to a range of ITS services.

PRESENCE IN ATLANTIC CANADA

Years in operation:	6
Number of Employees:	5
Employees in Atlantic Region:	100%

MARKET GEOGRAPHY



PRINCIPAL ACTIVITIES

- Product development and related consulting services.

Enseignes Imperial Signs 20

COORDINATES

Head Office: Edmunston NB

Mailing Address: 113 – 44 E Avenue
Edmunston, NB
E3V 3A4

Telephone: 506-735-5506
Facsimile: 506-737-1734
Internet: www.enseignes.com

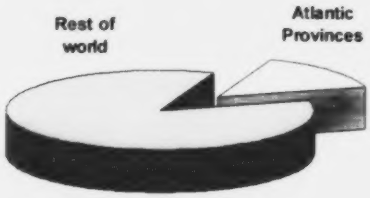
PRODUCTS/SERVICES RELATED TO ITS

- Electronic signs and message centres; e.g. the software-controlled, tri-vision signs developed for the Fredericton-Moncton Highway.
- A variety of sign types, including fibre-optic LED.
- Adaptable for a range of ITS services, including traffic management and traveler information systems.

PRESENCE IN ATLANTIC CANADA

Years in operation:	39
Number of Employees:	400
Employees in Atlantic Region:	65%

MARKET GEOGRAPHY



PRINCIPAL ACTIVITIES

- Product development, manufacturing, research, systems integration, and related consulting services.

Geonet Technologies Inc. 21

COORDINATES

Head Office:	Central Bedeque PEI
Mailing Address:	P.O. Box 3989 966 Callbeck Street Central Bedeque, PEI C0B 1G0
Telephone:	902-887-3170
Facsimile:	902-887-2349
Internet:	www.geonet-tech.com

PRODUCTS/SERVICES RELATED TO ITS

- Civic addressing for 911 emergency response dispatching support.
- Asset location and inventory.
- Off-line highway information.

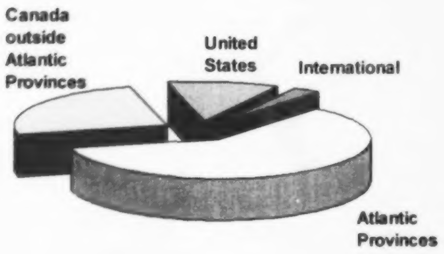
PRESENCE IN ATLANTIC CANADA

Years in operation:	8
Number of Employees:	15
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Product development and related consulting and training.

MARKET GEOGRAPHY



Geoplan Consultants Inc. 22

COORDINATES

Head Office:	Fredericton NB
Mailing Address:	919 Prospect Street W Fredericton, NB E3B 2T7
Telephone:	506-451-0055
Facsimile:	506-450-4838
Internet:	www.geoplan.nb.ca

PRODUCTS/SERVICES RELATED TO ITS

- Civic addressing for enhanced 911 services.
- Other geomatics-related applications adaptable to a range of ITS position determination and navigation functions.

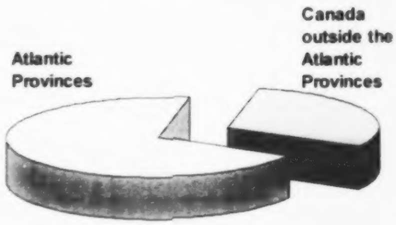
PRESENCE IN ATLANTIC CANADA

Years in operation:	14
Number of Employees:	15
Employees in Atlantic Region:	95%

PRINCIPAL ACTIVITIES

- Product development (software) and related consulting services.

MARKET GEOGRAPHY



International Communications and Navigation Ltd 23

COORDINATES

Head Office: St. John's NF & LA

Mailing Address: 27 Austin Street
St. John's, NF
A1B 4C3

Telephone: 709-754-0400
Facsimile: 709-754-0419
Internet: www.ican.nf.net

PRODUCTS/SERVICES RELATED TO ITS

- Electronic charting and integration of navigation with other data.
- Data communications, security, and surveillance systems.
- Tracking systems, transponders, and collision avoidance systems.
- Mostly marine-related but potentially adaptable to land-based ITS requirements.

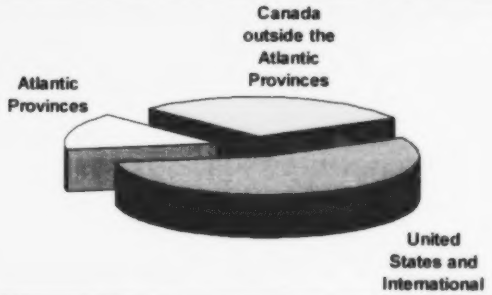
PRESENCE IN ATLANTIC CANADA

Years in operation:	6
Number of Employees:	23
Employees in Atlantic Region:	95%

PRINCIPAL ACTIVITIES

- Product development, system integration, e-learning, and related consulting services.

MARKET GEOGRAPHY



Intrignia Solutions Inc. 24

COORDINATES

Head Office: St John's NF & LA

Mailing Address: PO Box 23228
St John's NF
A1B 4J9

Telephone: 709-682-4219
Facsimile: 709-772-2462
Internet: www.intrignia.com

PRODUCTS/SERVICES RELATED TO ITS

- Robotics, computer vision, control systems, instrumentation.
- Intelligent and automated control systems.
- Multi-vehicle route and task planning and optimization.
- Primarily related to mining and marine applications but potentially adaptable to a range of ITS services.
- Emerged from Memorial University Instrumentation, Automation and Control Lab

PRESENCE IN ATLANTIC CANADA

Years in operation:	2
Number of Employees:	3
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Product development, system integration, and related consulting services.

MARKET GEOGRAPHY

INFORMATION NOT AVAILABLE

Kinek Technologies Ltd. 25

COORDINATES

Head Office:	Saint John NB
Mailing Address:	15 Market Square, 12th Floor Saint John, NB E2L 1E8
Telephone:	506-694-1250
Facsimile:	506-694-1260
Internet:	www.kinek.com

PRODUCTS/SERVICES RELATED TO ITS

- Delivery fleet routing optimization based on dynamic assignment to collection points and electronic messaging.
- Potential adaptability to other fleet management functions.

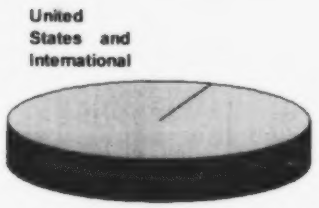
PRESENCE IN ATLANTIC CANADA

Years in operation:	2
Number of Employees:	55
Employees in Atlantic Region:	95%

PRINCIPAL ACTIVITIES

- Product development, system integration, and related training and consulting services.

MARKET GEOGRAPHY



Jack McGaw Consulting Incorporated 26

COORDINATES

Head Office:	Halifax NS
Mailing Address:	1525 Birmingham St. Halifax NS B3J 2J6
Telephone:	902-423-5585
Facsimile:	902-423-5433
Internet:	

PRODUCTS/SERVICES RELATED TO ITS

- Licensing, development and operation of a traveler information FM radio service for the Confederation Bridge

PRESENCE IN ATLANTIC CANADA

Years in operation:	7
Number of Employees:	1
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Development and operation of radio services

MARKET GEOGRAPHY

INFORMATION NOT AVAILABLE

J.J. MacKay Canada Ltd.

27

COORDINATES

Head Office: New Glasgow NS

Mailing Address: 1342 Abercrombie Road
P.O. Box 338
New Glasgow, NS
B2H 5E3

Telephone: 902-752-5124
Facsimile: 902-752-5955
Internet: www.jjmackay.com

PRESENCE IN ATLANTIC CANADA

Years in operation:	40
Number of Employees:	150
Employees in Atlantic Region:	80%

PRINCIPAL ACTIVITIES

- Product development, manufacturing, and related consulting services.

PRODUCTS/SERVICES RELATED TO ITS

- Intelligent parking meters using smart cards. Programmable for different parking pricing strategies. Provides parking data.
- Networked pay-and-display units.
- Potential tie-in to parking information systems and traveller information systems.
- Smart-card could be multi-purpose (transit fares etc.)

MARKET GEOGRAPHY

INFORMATION NOT AVAILABLE

Measurand Inc.

28

COORDINATES

Head Office: Fredericton NB
Mailing Address: 2111 Hanwell Road
Fredericton, NB
E3C 1M7

Telephone: 506-462-9119
Facsimile: 506-462-9095
Internet: www.measurand.com

PRESENCE IN ATLANTIC CANADA

Years in operation:	9
Number of Employees:	12
Employees in Atlantic Region:	100%

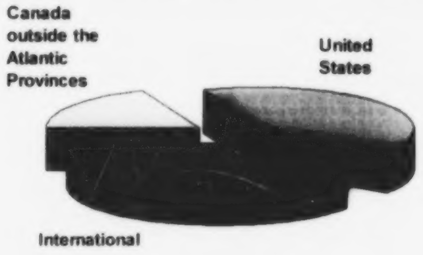
PRINCIPAL ACTIVITIES

Research, product development, and manufacturing.

PRODUCTS/SERVICES RELATED TO ITS

- Fibre-optic shape and curvature sensors applicable to occupant detection and impact detection in automobiles.

MARKET GEOGRAPHY



PEI Innovations Inc.

29

COORDINATES

Head Office:	Cardigan PEI
Mailing Address:	P.O. Box 21014 Cardigan RR#5 Cardigan, PEI C0A 1G0
Telephone:	902-583-2000
Facsimile:	902-583-3067
Internet:	www.pei-

PRODUCTS/SERVICES RELATED TO ITS

- Shock, pressure, temperature, acceleration sensors – used to monitor condition of products.
- Associated data-logging and interface with handheld PC's.
- Cargo and freight status and location monitoring system under development.
- Investigating road-salt monitoring system.

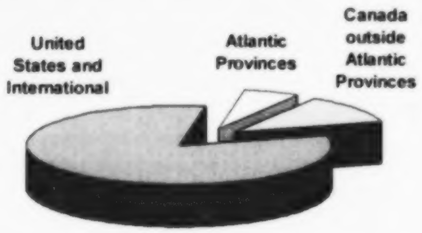
PRESENCE IN ATLANTIC CANADA

Years in operation:	3
Number of Employees:	6
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Product development, systems integration, research, and some fabrication.

MARKET GEOGRAPHY



Pintér Consulting Services Inc.

30

COORDINATES

Head Office:	Halifax NS
Mailing Address:	129 Glenforest Drive Halifax, NS B3M 1J2
Telephone:	902-443-5910
Facsimile:	902-431-5100
Internet:	www.is.dal.ca/~jdpinter

PRODUCTS/SERVICES RELATED TO ITS

- Systems modelling and optimization.
- Routing and scheduling systems.
- Methods applicable to a variety of ITS services.

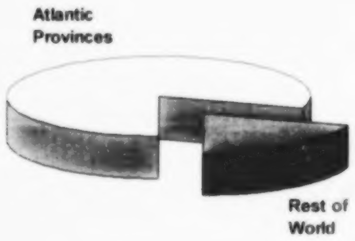
PRESENCE IN ATLANTIC CANADA

Years in operation:	8
Number of Employees:	1
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

Research, product development, and related consulting services.

MARKET GEOGRAPHY



Satlantic Inc.

31

COORDINATES

Head Office:	Halifax NS
Mailing Address:	3481 Marginal Road N Richmond Terminal Pier 9 Halifax, NS
Telephone:	902-492-4780
Facsimile:	902-492-4781
Internet:	www.satlantic.com

PRODUCTS/SERVICES RELATED TO ITS

- Passive optical remote sensing for oceanographic applications.
- Remote system control and power management.
- Data transmission using cellular network, RF/satellite, internet.
- Data fusion.
- Experience is potentially transferrable to ITS applications.

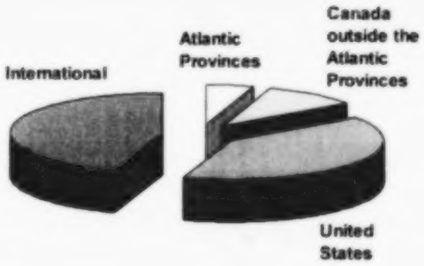
PRESENCE IN ATLANTIC CANADA

Years in operation:	12
Number of Employees:	40
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Research, product development, system integration, and manufacturing/assembly.

MARKET GEOGRAPHY



Seimac Limited

32

COORDINATES

Head Office:	Dartmouth NS
Mailing Address:	271 Brownlow Avenue Dartmouth, NS B3B 1W6
Telephone:	902-468-3007
Facsimile:	902-468-3009
Internet:	www.seimac.com

PRODUCTS/SERVICES RELATED TO ITS

- Meteorological forecasting for RWIS systems in NS. Looking into RWIS for NFLD & LAB. Looking also at route-based forecasting.
- Sensor-capable satellite-based transmitters distributed as OEM product.
- GPS-based asset tracking, positioning, and dispatching (trucks, containers, etc.).

PRESENCE IN ATLANTIC CANADA

Years in operation:	24
Number of Employees:	55
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Research, product development, system integration, and manufacturing..

MARKET GEOGRAPHY

INFORMATION NOT AVAILABLE

SGE Group Inc 33

COORDINATES

Head Office:	St. John's NF & LA
Mailing Address:	P.O. Box 13144 St. John's, NF A1B 4A4
Telephone:	709-576-7344
Facsimile:	709-576-0374
Internet:	www.accesstec.ca

PRODUCTS/SERVICES RELATED TO ITS

- Transportation consulting related to advanced traffic signal control systems (SCOOT), parking information systems, remote traffic data collection, automated billing systems.
- Transportation information systems design and other information-related technology

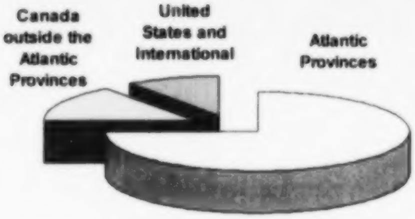
PRESENCE IN ATLANTIC CANADA

Years in operation:	30
Number of Employees:	120
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Product development, system integration, e-learning, and related consulting services.

MARKET GEOGRAPHY



Spatial Decision Support Systems Ltd. 34

COORDINATES

Head Office:	Charlottetown PEI
Mailing Address:	38 University Avenue Charlottetown, PEI C1A 4K6
Telephone:	902-368-1901
Facsimile:	
Internet:	

PRODUCTS/SERVICES RELATED TO ITS

- GIS-based school-bus routing optimization.
- Potential expansion to fleet management and emergency services routing applications.

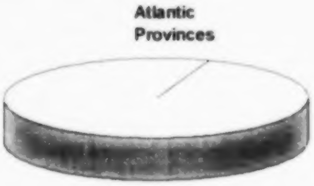
PRESENCE IN ATLANTIC CANADA

Years in operation:	8
Number of Employees:	3
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Product development and related consulting services.

MARKET GEOGRAPHY



SVG Consulting Inc.

35

COORDINATES

Head Office:	Upper Coverdale NB
Mailing Address:	2141 Coverdale Road Upper Coverdale, NB E1J 1Z8
Telephone:	506-372-9198
Facsimile:	
Internet:	

PRODUCTS/SERVICES RELATED TO ITS

- ITS strategic planning and policy.
- Transportation planning and policy.

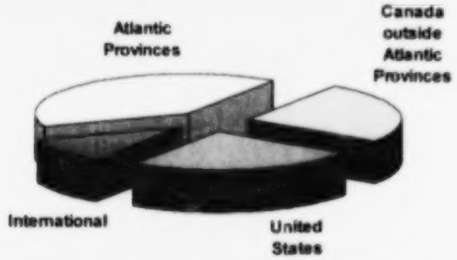
PRESENCE IN ATLANTIC CANADA

Years in operation:	2
Number of Employees:	2
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

- Consulting services.

MARKET GEOGRAPHY



Trip Data & Safety Management Inc.

36

COORDINATES

Head Office:	Moncton NB
Mailing Address:	383 Baig Boulevard Moncton, NB E1E 4H8
Telephone:	506-853-7522
Facsimile:	506-853-7612
Internet:	www.tdsm.com

PRODUCTS/SERVICES RELATED TO ITS

- Commercial vehicle drivers log audit and reporting systems. Can be integrated with GPS and with other modules such as fuel tax reporting, safety deficiencies logging, etc.
- Potential adaptability to more comprehensive fleet management system.

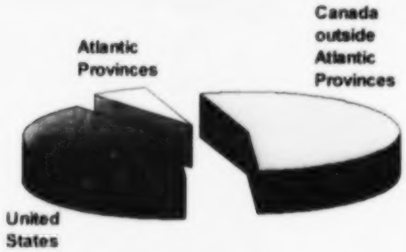
PRESENCE IN ATLANTIC CANADA

Years in operation:	23
Number of Employees:	5
Employees in Atlantic Region:	100%

PRINCIPAL ACTIVITIES

Product development, and related training and consulting services.

MARKET GEOGRAPHY



Jacques Whitford Environment 37

COORDINATES

Head Office:	Dartmouth NS
Mailing Address:	3 Spectacle Lake Drive Dartmouth, NS B3B 1W8
Telephone:	902-468-7777
Facsimile:	902-468-9009
Internet:	

PRODUCTS/SERVICES RELATED TO ITS

- Transportation infrastructure management, including radar-based bridge deck condition assessment at highway speeds
- Transportation systems expertise applicable to a range of ITS initiatives including RWIS and real-time control of maintenance operations.

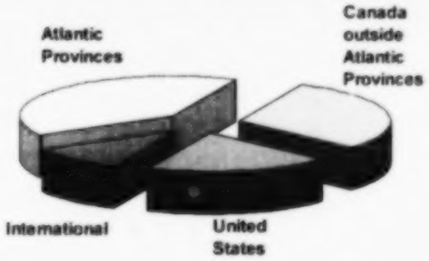
PRESENCE IN ATLANTIC CANADA

Years in operation:	30
Number of Employees:	900
Employees in Atlantic Region:	45%

PRINCIPAL ACTIVITIES

- Consulting services.

MARKET GEOGRAPHY



xwave 38

COORDINATES

Head Office:	Halifax NS
Mailing Address:	36 Solutions Drive Halifax, NS B3S 1N2
Telephone:	902-495-2000
Facsimile:	902-495-2095
Internet:	www.xwave.com

PRODUCTS/SERVICES RELATED TO ITS

- Mobile police information systems.
- Parking enforcement management systems.
- Emergency (911) systems.
- Real-time communications and control.
- Many of systems applicable to ITS as-is or with some adaptation.

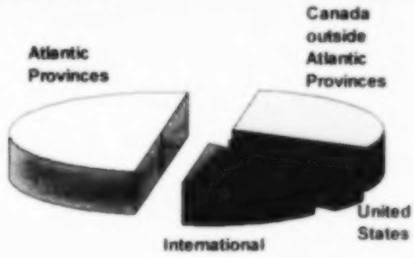
PRESENCE IN ATLANTIC CANADA

Years in operation:	4
Number of Employees:	2800
Employees in Atlantic Region:	60%

PRINCIPAL ACTIVITIES

- Research and product development, system integration, custom manufacturing, and related consulting services.

MARKET GEOGRAPHY



APPENDIX N

Information Technology Association Members

Appendix N – Information Technology – Association Members

NEW BRUNSWICK
(Business New Brunswick)

BUSINESS	LOCATION	INTERNET ADDRESS
A Bound Corporation	Miramichi	
Accesstec Inc.	Fredericton	www.accesstec.ca
ADI Group Inc.	Fredericton	www.adi.ca
Adtech Manufacturing Ltd.	Fredericton	
Advanced Business Services	Fredericton	www.abs.ca
Advanced Monitoring Technologies Inc.	Keswick	www.amt.nb.ca
Advatek Systems Inc.	Moncton	
ALT Group Inc.	Miramichi	www.altgroupinc.com
Anyware Group	Saint John	www.anywaregroup.com
Approach Navigation Systems Inc	Dieppe	www.approach.nb.ca
Atlantic Data Group	Moncton	www.eagleeyedvr.com
Beltek Systems Design Inc.	Dieppe	www.beltek.com
CARIS	Fredericton	www.caris.com
Content Alive Inc.	Fredericton	www.contentalive.com
DealerMine Inc.	Saint John	www.dealertrack.ca
DOVICO	Dieppe	www.dovico.com
DPL Group	Saint John	www.dpl.ca
e-Novations Comnet Inc.	Fredericton	www.e-novations.ca
Enseigne Imperial Signs	Edmunston	www.enseignes.com
Geo Research Systems Inc.	Fredericton	www.geodaci.com
Geodat Information Services Ltd.	Fredericton	www.geodat.nb.ca
Geoplan Consultants Inc.	Fredericton	www.geoplan.nb.ca
InteliSys Aviation Systems Inc.	Shediac	www.ameliasoftware.com
Interactive Visualization Systems Inc.	Fredericton	www.ivs.unb.ca
Kinek Technologies Inc.	Saint John	www.kinek.com
Learnstream Inc.	Fredericton	www.learnstream.com
Lexi-tech Inc.	Dieppe	www.lexitech.ca
Measurand Inc.	Fredericton	www.measurand
Nanoptix Inc.	Dieppe	www.nanoptix.com
Optex Inc.	Fredericton	www.optex.nb.ca
Rydan Customer Management Inc.	Moncton	www.rydan.com
Spectral Visualization Development	Fredericton	www.svdinc.com
SVG Consulting Inc.	Upper Coverdale	
Trip Data & Safety Management Inc.	Moncton	www.tdsm.com
Twisted Air Technologies Inc.	Fredericton	www.twistedair.com
xwave	Fredericton	www.xwave.com

NEWFOUNDLAND & LABRADOR

(Newfoundland and Labrador Association of Technology Industries)

BUSINESS	LOCATION	INTERNET ADDRESS
Academy Canada	Corner Brook	www.academycanada.com
Breton Solutions Information Systems	St John's	
Canadian Centre for Marine Communications	St. John's	www.ifmt.nf.ca
Canpolar East Inc.	St. John's	www.canpolar.com
CanSomebodyHelpMe.com	Stephenville	www.cansomebodyhelpme.com
C-CORE	St. John's	www.c-core.ca
Ceridian Canada Ltd.	St. John's	www.ceridian.ca
CGI Information Systems and Management Consultants Inc.	St. John's	
College of the North Atlantic	Clarenville	www.northatlantic.nf.ca
Compusult Ltd.	Mount Pearl	www.compusult.nf.ca
Computers and Communications Ltd.	Deer Lake	www.micsystems.ca
Consolidated Technologies Ltd	St. John's	www.contechnav.com
Coretec Inc.	St. John's	www.coretec.nf.net
Cyber Zone Network	St. John's	www.cyber-zone.net
Earth Information Technologies (NF) Ltd.	St. John's	
Edwards & Associates Ltd.	Marystown	www.ncf.ca/~cr975/charity1.html
Exploits Centre for Information Technology Excellence	Windsor	www.exploitsvalley.nf.ca
GeoData Ltd.	St. John's	
Geographic Data Services Inc.	St. John's	www.gds.nf.net
Geo-Matics Services Ltd	Topsail	
Graduate Centre of Applied Technology	St. John's	www.graduatecentre.com
Group Telecom	St. John's	www.gt.ca
Guigne Technologies Ltd.	St. John's	www.guigne.com
iMIRADOR.com Inc.	St. John's	
In Corp.	St. John's	
InfoTech Canada Inc.	St. John's	www.infotechcanada.com
Innovative Business Solutions, Inc.	Mount Pearl	
Instrumar Ltd.	St. John's	www.instrumar com
Intrignia Solutions Inc.	St. John's	www.intrignia.com
Kittiwake Economic Development Corporation	Gander	www.kittiwake.nf.ca
MIRA Incorporated	Lumsden	
MUN (Memorial University) - Office of Research	St. John's	www.mun.ca/research/
Northstar Network Ltd.	St. John's	www.northstar-network.net
Nautical Data International Inc.	St. John's	www.ndi.nf.ca
PATHFINDER Information Technologies Ltd.	St. John's	www.pathfinder.nf.net
Plato Group Inc.	St. John's	www.platogroup.com
PNI (Pivitol)	St. John's	www.pni-corp.ca
Professional Institute of Applied Technology	St. John's	www.piat-it.com
Resource Concepts Inc.	St. John's	
SGE Group Inc.	Clarenville	www.sgegroup.com
Systems 'N' Solutions Limited	St. John's	www.sns-nf.com
Team IT	St. John's	www.teamit.net
Triton Data Inc.	St. John's	www.triton.nf.ca
Triware Technologies Inc.	St. John's	www.triware.nf.ca
W.G. Smith Associates	St. John's	
Where? Media	St. John's	www.wheremedia.com

NOVA SCOTIA

(Information Technology Industrial Alliance of Nova Scotia)

BUSINESS	LOCATION	INTERNET ADDRESS
Aardvark Computer Solutions, Inc.	Halifax	www.aardvarkinc.com
Acadia University	Wolfville	www.acadiau.ca
AgendaTech Inc.	Bedford	www.agendatech.com
Alan Bailey Consulting	Bedford	www.abaileyconsult.com
Aliant Telecom Inc.	Halifax	www.aliant.ca
AlgoPlus Consulting Limited	Halifax	www.aviationsos.com
Altimax Network Service Limited	Dartmouth	www.altimax.com
Amirix Systems Inc.	Halifax	www.amirix.com
APSCON Software Specialist	Halifax	www.apscon.com
Arc 9 Interactive (Vertigo)	Halifax	www.vertigo-interactive.com
Atlantec Solutions Inc.	Halifax	www.atlantecsolutions.com
Atlantic Data Group	Halifax	www.eagleeyedvr.com
Blanchard, Ian	Halifax	
BROADleaf Technology Solutions	Halifax	www.broadleaf.ca
Business Internetworks Technologies Inc.	Halifax	
C.L. Douglas Centre for Computer Studies	Bedford	www.cldouglas.com
CABCO Communications Group	Dartmouth	www.cabco.ca
Campbell, Paul	Porter's Lake	
CANIMPEX Enterprises Ltd. [CPX-Solutions]	Halifax	www.canimpex.ns.ca
CDI College of Business & Technology	Halifax	www.cdi.ca
Centre of Geographic Sciences (COGS)	Lawrencetown	www.cogs.ns.ca
CGI Information Systems & Management Consultants Inc.	Halifax	www.cgi.ca
Collanet Solutions	Truro	
CompuCollege School of Business	Halifax	www.compucollegeatlantic.ca
Computerease Limited	Dartmouth	www.computerease.ca
Cornerstone Project Management Group Inc.	Halifax	www.strongerbusiness.com
CorporaTel	Halifax	www.corporatel.ca
Cybergarden Inc.	Halifax	www.cybergarden.ca
DDA Computer Consultants Ltd.	Halifax	www.dda.ns.ca
Delphi Systems Inc.	Scotsburn	
Dicks, Dion	Halifax	
DMR (Fujitsu) Consulting Group Inc.	Halifax	www.dmr.ca
Dymaxion Research Limited	Halifax	www.dymaxion.com
eCENTRICS	Bedford	www.ecentrics.ca
EDS Systemhouse Inc.	Halifax	www.eds.ca
e-Hub.net	Moncton, NB	www.e-hub.net
Ernst & Young	Halifax	www.eycan.com
Garvin-Allen Solutions Ltd.	Halifax	www.garvin-allen.com
Genesis Technology Alliance	Fall River	
Gigablink Learning Technologies	Dartmouth	www.gigablink.com
Gough Technology Group Inc.	Halifax	www.goughtechgroup.com
Group Telecom	Halifax	www.gt.ca
GSA Search Consultants	Bedford	www.gsa-search.com
GWA Training Brokers Inc.	Halifax	www.GWATrainingBrokers.com
Hayne Web Design	Dartmouth	
Imperatore, Marco	Bedford	
inmedia Public Relations	Halifax	www.inmedia.ca

NOVA SCOTIA
(Information Technology Industrial Alliance of Nova Scotia)

BUSINESS	LOCATION	INTERNET ADDRESS
Iramp Incorporated	Halifax	www.iramp.ca
Island Career Academy	Sydney	www.islandcareeracademy.ns.ca
ITIC-UCCB	Sydney	
JNL Data	Halifax	
KBT Training Solutions	Halifax	
Know IT Consulting	Halifax	www.knowitconsulting.com
Lans-2-Wans Networks Incorporated	Halifax	
Lucas Technology	Halifax	
J.J. Mackay Canada Ltd.	New Glasgow	www.jjmackay.com
Maximizing Today's Telecommunications Inc. (MTTI)	Dartmouth	www.mtti.ns.ca
Metocean Data Systems Ltd.	Dartmouth	www.metocean.com
Mister Webpage	Waterville	
Nicom Ltd.	Dartmouth	www.nicomltd.com
NorthSeas Software, Inc.	Dartmouth	
Nova Scotia Community College	Halifax	www.nscc.ns.ca
one80 Knowledge Systems Inc.	Halifax	
Open Source Information Systems	Halifax	www.opensource-is.com
Pictorius Incorporated	Halifax	www.pictorius.com
Pinter Consulting Services Inc.	Halifax	is.dal.ca/~jdpinter
Plan B Solutions	Halifax	www.planbsolutions.net
Preclarus Inc.	Truro	www.preclarus.ca
Proactive Media Consultants Inc.	Halifax	
Productivity Solutions Inc.	Hubbards	
Quality Business Results Inc.	Springhill	
Rising Sun Computer Software	Halifax	
Satlantic Inc.	Halifax	www.satlantic.com
Scientific Decisions Inc.	Halifax	www.ScientificDecisions.com
SDI Systems Inc.	Halifax	
Seimac Limited	Dartmouth	www.seimac.com
Semaphore Solutions	Halifax	www.semaphoresupport.com
ServiceOne Incorporated	Halifax	
Sierra Systems Consultants Inc.	Halifax	www.sierrasys.com
Smith, Rodney	Mineville	
St. F.X. Enterprise Development Centre	Antigonish	www.stfx.ca
St. Mary's University	Halifax	www.stmarys.ca
Syntel Consultancy Inc	Halifax	
Tecsult-EduPlus Inc.	Dartmouth	www.eduplus.ca
Telecom Applications Research Alliance (TARA)	Halifax	www.tara.ca
The daVinci Institute	Dartmouth	www.the-davinci-institute.com
ThinWEB Technologies Inc.	Halifax	www.thinweb.com
Tilde Business Intelligence	Halifax	www.tilde.ca
TM Software Inc.	Halifax	www.tm-soft.com
Trihedral Engineering	Bedford	www.trihedral.com
Umbrella Technologies	Dartmouth	www.angelfire.com/weird2/kevinatwood/%20ut.htm
Visible Knowledge Consulting Inc.	Halifax	
Wilkie Consulting Group	Fall River	

NOVA SCOTIA (Information Technology Industrial Alliance of Nova Scotia)		
BUSINESS	**LOCATION**	**INTERNET ADDRESS**
XIOtech	Bedford	
xwave	Halifax	www.xwave.com

PRINCE EDWARD ISLAND

(Information Technologies Association of Prince Edward Island)

BUSINESS	LOCATION	INTERNET ADDRESS
AcA Digital Knowledge	Wellington	www.uniglocal.com
Academy of Learning	Charlottetown	www.academyol.com
Advantage Communications Inc.	Charlottetown	www.advantagecall.com
Auracom Internet Services	Charlottetown	www.pei.auracom.com
Baker Consulting Inc.	Charlottetown	www.bcinc.pe.ca
Baseline Business Geographics	Charlottetown	www.baselinegeo.com
Bongen Communications Inc.	Stanhope	
Business Technology Consulting	Charlottetown	www.btc.pe.ca
Caltech Information Technologies	Charlottetown	www.caltech.ca
Canadian Cable Ad Productions	Summerside	www.tvadspei.com
Career Skills	Charlottetown	www.careerskills.pe.ca
CIFTA Technologies	Wellington	www.cifta.com
Cellar Door Productions	Charlottetown	www.cellardoor.tv
Coastal Destination	Charlottetown	www.peisland.com
Cogsdale Corporation	Charlottetown	www.cogsdale.com
CompuCollege School of Business	Charlottetown	www.compucollegeatlantic.ca
Computer Dynamics	Charlottetown	
Computer Renaissance	Charlottetown	www.compren.pe.ca
CSC Services Limited	Stratford	www.watchcan.com
Cymbiant Technologies Inc	Charlottetown	www.cymbiant.ca
Dealer Soft	Charlottetown	www.dealersoft.com
Deja Design Studio	Charlottetown	www.dejawebs.com
DeltaWare Systems	Charlottetown	www.deltaware.com
EastLink Communications	Charlottetown	www.eastlink.ca
EDS Canada Inc.	Charlottetown	www.eds.com
Engineering Technologies Canada Ltd.	Stratford	www.engtech.ca
ExaComm Computers	Charlottetown	www.exacomm.net
Future Learning Inc.	Charlottetown	www.futurelearning.com
G/COM	Summerside	
Garden Isle Computing Inc.	Charlottetown	www.gardenisle.pe.ca
GE Capital IT Solutions	Charlottetown	www.gectms.ca
GeoNet Technologies	Central Bedeque	www.geonet-tech.com
Grant Thornton	Charlottetown	www.grantthornton.ca
Graphic Communications Inc	Charlottetown	www.graphcom.pe.ca
Hamlin Alliance Group Ltd.	Charlottetown	www.hamlinalliance.com
Holland College	Charlottetown	www.hollandc.pe.ca
HomePage Design Inc	Charlottetown	www.peisland.com
HR Associates	Charlottetown	
Icon Data Systems	Summerside	www.icondata.com
ImageWorks PEI Inc.	Charlottetown	www.iwpei.com
InternetWorks Ltd.	Charlottetown	www.internetworks.ca
Island Services Network	Charlottetown	www.isn.net
Island Telecom Inc.	Charlottetown	www.islandtel.pe.ca
Island Tel Advanced Solutions	Charlottetown	www.itas.net
iWave.com	Charlottetown	www.iwave.com
Lomar Inc. / One Stop Info Shop	RR#3 Summerside	
L.P. Computer Solutions	Wellington	

PRINCE EDWARD ISLAND

(Information Technologies Association of Prince Edward Island)

BUSINESS	LOCATION	INTERNET ADDRESS
MacIsaac Younker Roche Soloman	Charlottetown	www.myrs.pe.ca
M.F. Schurman Company Ltd.	Summerside	
MicroAge Computer Centres	Charlottetown	www.microagepei.com
Minolta Business Equipment Canada	Charlottetown	
NextWave Corporation	Charlottetown	www.nextwavecorp.ca
NIX Information Systems	Stratford	
N.R. Computronics Ltd.	Charlottetown	www.make-it-simple.com
Montague Computer Inc. 1997	Montague	www.mci97.com
On-Line Support Inc	Charlottetown	www.onlinesupport.ca
Patterson Palmer Hunt Murphy	Charlottetown	www.pphm.com
PEI Innovations Inc.	Charlottetown	www.pei-innovations.com
Point of Sale Advantage	York	www.retailmagic.com
PricewaterhouseCoopers	Charlottetown	
Printer Works / Laser Solutions Inc.	Charlottetown	www.printerworks.ca
Redisle*technology*.com	Charlottetown	redisletechnology.com
Renewal Consulting Group Inc.	Charlottetown	www.renew.com
Results Marketing	Charlottetown	
Revolution Media	Summerside	www.revolution.ca
Shared Solutions Inc.	Charlottetown	
Silverorange	Charlottetown	www.silverorange.com
Softworld 2002	Charlottetown	www.softworld2002.com
Spatial Decision Support Systems Ltd.	Charlottetown	
Spell Read P.A.T.	Charlottetown	www.spellread.com
Stewart McKelvey Stirling Scales	Charlottetown	www.smss.com
TACS Software Programming	Charlottetown	www.tacsltd.com
Tech-Rep Limited	Charlottetown	www.tech-rep.net
Technomedia Inc.	Charlottetown	www.technomediapei.com
Timeless Technologies	Belfast, Charlottetown	www.timelesstech.com
Unisys Canada	Charlottetown	www.unisys.com
University of Prince Edward Island	Charlottetown	www.upei.ca
Virtual Art	Mount Stewart	www.virtuo.com
VisionQuest	Charlottetown	www.vision-quest.ca
Website Advantage Inc	Charlottetown	www.wsadvantage.com
Watts Communication Inc.	Charlottetown	
Wireless Island	Summerside	www.wirelessisland.net

APPENDIX O

Members of Selected Clusters

Appendix O – Members of Selected Clusters

CANADIAN CENTRE FOR MARINE COMMUNICATIONS (Multi-disciplinary) (www.ccmc.nf.ca)
Algoma Central Marine
Aliant Telecom Inc
AMEC
Atlantic Canada Opportunities Agency
Atlantic Communications Enterprises Ltd
Atlantic Electronics Limited
C-CORE
Canadian Coast Guard
Canadian Hydrographic Service
Canadian Wireless Telecommunications
CanStar Innovations Inc.
CARIS
Centre for Research in Earth and Space Technology
CMC Electronics Inc.
Coflexip Stena Offshore Newfoundland Limited
Collaborative Network Technologies Inc.
Communications Research Centre
Compusult Limited
Consilient Technologies Corp.
Consolidated Technologies Limited
CORETEC Incorporated
Corriolus Novatech
Earth Information Technologies (NFLD) Limited
Fugro Jacques Geosurveys
GeoNet Technologies Inc.
Geo-Resources Inc.
Government of Canada, Department of National Defence
Government of Newfoundland and Labrador, Department of Industry, Trade and Technology
Government of Nova Scotia.
Guigné International Ltd.
Helical Systems Ltd.
Heynetwork.com Canada, Inc.
Husky Oil.
Hyperspectral Data International Inc.
IDON East Corporation
InfoMagnetics Technologies Corporation.
Information Technology Industry Alliance of Nova Scotia.
Infotech Canada.
Innova Quest Inc.
Institute for Pacific Ocean Science & Technology
INSTRUMAR
Interactive Visualization Systems Inc. (IVS).
International Communications & Navigation Ltd.
International Hydrographic Management Consulting (IHMC) Ltd.
International Submarine Engineering Ltd.
LOTEK Marine Technologies Inc.
MacDonald Dettweiler

CANADIAN CENTRE FOR MARINE COMMUNICATIONS (Multi-disciplinary) (www.ccmc.nf.ca)
Marine Institute.
Memorial University of Newfoundland
NATI
Nautical Data International, Inc.
NewTel Communications Inc.
Northern Radar Systems Ltd.
Northstar Technical Inc.
Oceans.
Offshore Systems International Ltd.
OKAMLogic Inc.
Operation ONLINE.
Precarn Inc.
Provincial Airlines Limited.
Quester Tangent.
Raytheon Canada Limited.
Remas Inc.
Rutter Technologies Inc.
Sable Offshore Energy Inc.
SeaQuest Technologies.
Seimac Ltd.
Sigma Engineering Limited.
Stratos Global Corporation.
Telehealth & Educational Technology Resources Agency.
Thales Systems Canada.
TLC Corporation.
Transport Canada.
TwoLofts Inc.
Western Marine Community Coalition.
xwave Solutions.
ZenTech Limited.

MacDonnell Group (primarily Geomatics) (www.mgnet.ca)
Ati Consulting
Eastcan Geomatics
Marineserve.mg
Phoenix.mg
Sargent & Vaughan Engineering
Vaughan Engineering
Vaughan International
Vaughan International (India) Limited

Northstar Network Ltd. – East Coast (Defence, aerospace, marine) (www.northstar-network.net)
Canadian Centre for Marine Communications
Century 2K
CHC Composites Incorporated
College of the North Atlantic
Compusult Limited
CORETEC Incorporated
IDON East
Media Touch Technologies Limited
NEWDOCK St. John's Dockyard Limited
Northstar Technical Incorporated.
Steelcor Manufacturing Corporation
Terra Nova Marine Company Limited
TwoLofts Incorporated
ZeddComm Incorporated

CHAMPLAIN INSTITUTE (Geomatics) (www.champlain-gis.com)
Atlantic Air Survey Limited
CARIS
CEF Consultants Ltd.
DATAQC
Earth Information Technologies
GeoNet Technologies Inc.
Geoplan Consultants
Hyperspectral Data Incorporated
Nova Spatial Inc.

APPENDIX P

Atlantic Provinces
ITS Project Profiles

Appendix P – Atlantic Provinces ITS Project Profiles

ITS Project Profile:
Province of Nova Scotia

Road Weather Information System (RWIS)

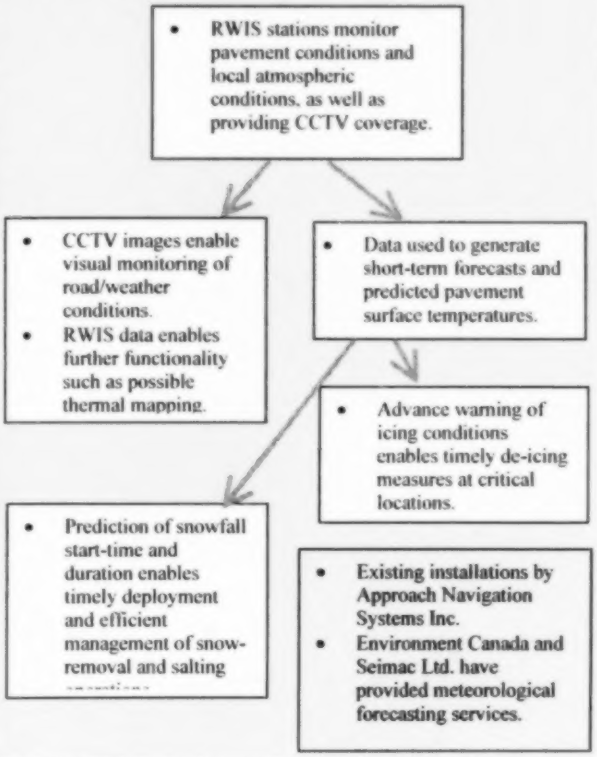
OBJECTIVES:
- Improve public safety.
- Advance warning of ice and snow affecting roads.
- Efficient allocation of winter maintenance effort.

SOLUTION:
- Installation of RWIS (Road Weather Information Systems) to monitor road pavement condition and micro-climatic data.
- Land-line or cellular modem connections to intranet serving maintenance personnel.
- Use of Environment Canada services for forecasting.

CURRENT STATUS:
- Currently 13 RWIS stations, 5 of these have operated for 5 years.
- 5 new stations are being installed in each of 2002 and 2003: with these, 70% of service area will be covered.
- Data access via intranet.

FUTURE OPTIONS:
- Extend geographic coverage.
- Investigate area-wide thermal mapping through fusing of RWIS inputs with inputs from mobile sources (snowplows).
- Use of internet for data

THE SYSTEM:



- RWIS stations monitor pavement conditions and local atmospheric conditions, as well as providing CCTV coverage.

- CCTV images enable visual monitoring of road/weather conditions.
- RWIS data enables further functionality such as possible thermal mapping.

- Data used to generate short-term forecasts and predicted pavement surface temperatures.

- Advance warning of icing conditions enables timely de-icing measures at critical locations.

- Prediction of snowfall start-time and duration enables timely deployment and efficient management of snow-removal and salting

- Existing installations by Approach Navigation Systems Inc.
- Environment Canada and Seimac Ltd. have provided meteorological forecasting services.

CONTEXT:
- There are 26,000 km of roads in Nova Scotia.
- A road condition reporting service is provided during the winter months (www.gov.ns.ca/tran/RoadConditions/road_conditions.stm)

ITS Project Profile:
Metrobus
Schedule Management System

St. John's, Newfoundland & Labrador

OBJECTIVES:

- Enhance customer service by providing real-time bus schedule information.
- Improve schedule adherence by providing real-time information to drivers on whether bus is ahead of or behind schedule.

SOLUTION:

- An AVL (Automatic Vehicle Location) system that pinpoints bus locations, facilitating schedule management.
- System also provides real-time information on bus arrivals so that patrons can plan their arrival at the bus stop to minimize their waiting time, particularly in inclement weather.

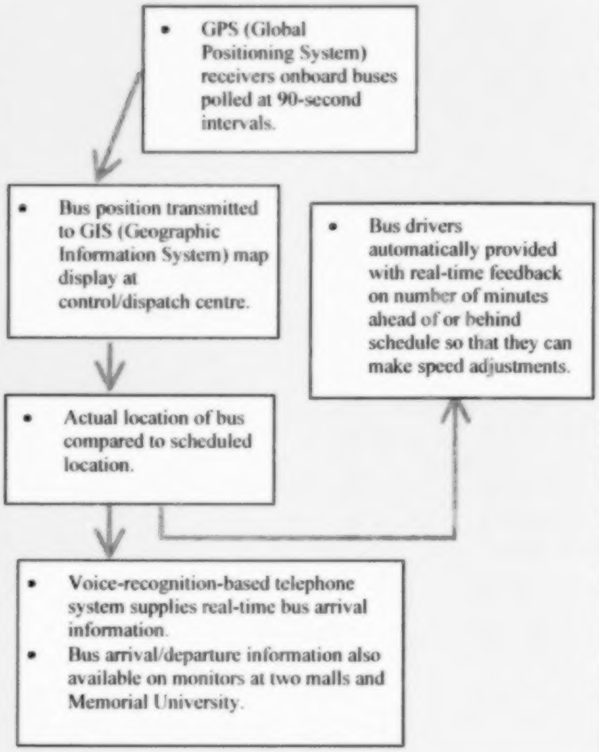
CURRENT STATUS:

- System is planned to be fully operational by June, 2002.
- Radio communications system is in place, the GPS receivers are being installed, and the software is being finalized.

FUTURE OPTIONS:

- Possible sharing of system infrastructure with public utilities to facilitate management of their fleets.
- Possible extension of schedule information system to Internet.

THE SYSTEM:



- GPS (Global Positioning System) receivers onboard buses polled at 90-second intervals.

- Bus position transmitted to GIS (Geographic Information System) map display at control/dispatch centre.

- Actual location of bus compared to scheduled location.

- Bus drivers automatically provided with real-time feedback on number of minutes ahead of or behind schedule so that they can make speed adjustments.

- Voice-recognition-based telephone system supplies real-time bus arrival information.
- Bus arrival/departure information also available on monitors at two malls and Memorial University.

CONTEXT:

- Metrobus operates a fleet of 53 buses, of which 43 are on the road during peak operating periods.
- The system consists of 20 bus routes, of which 5 operate at 30 minute headways and the remainder at 60 minute headways.
- 3.2 million riders use the Metrobus system annually.

ITS Project Profile:
Metro Transit
"GoTime" Real-time Tracking System

Halifax, Nova Scotia

OBJECTIVES:

- Enhance ability to effectively allocate buses to high-demand situations and respond to traffic congestion.
- Enhance ability to manage schedule adherence and other aspects of bus fleet

SOLUTION:

- AVL (Automatic Vehicle Location) system to track location of buses.
- Radio communications with drivers.
- Automated telephone system and monitors at key locations to provide bus arrival times.

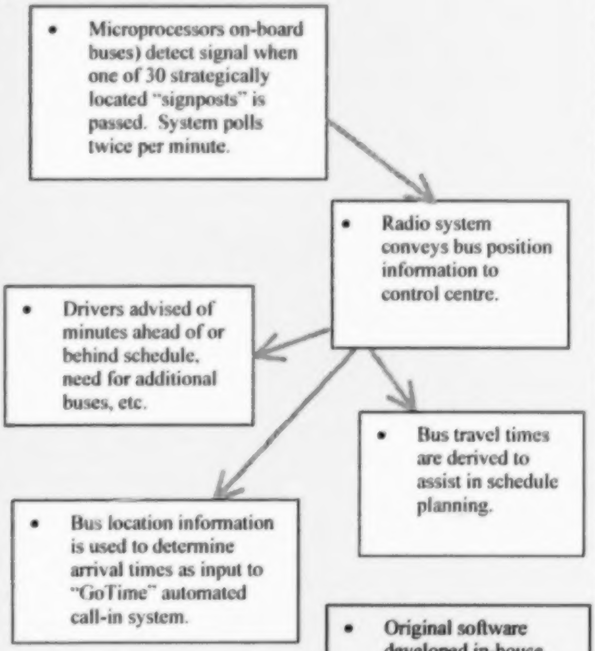
CURRENT STATUS:

- Initial deployment in 1987. Recent $2 million upgrade (1997).
- Benefits most obvious if system is down – need to deploy field supervisors.
- Benefits lie more in ability to move people better rather than better schedule adherence.

FUTURE OPTIONS:

- Possible future upgrade to GPS technology.
- Possible expansion to accessible (flexible-route) buses and service vehicles.
- Considering advanced fare collection technology.

THE SYSTEM:



- Microprocessors on-board buses) detect signal when one of 30 strategically located "signposts" is passed. System polls twice per minute.

- Radio system conveys bus position information to control centre.

- Drivers advised of minutes ahead of or behind schedule, need for additional buses, etc.

- Bus travel times are derived to assist in schedule planning.

- Bus location information is used to determine arrival times as input to "GoTime" automated call-in system.

- Original software developed in-house.
- Companies involved have included GMSI, Nova Communications, SGI

CONTEXT:

- Metro Transit carries 50,000 riders/day, 14 million/year.
- 155 buses are operated during peak periods on 48 routes.
- Average of 8,000 calls/day to "Go Time"; 15,000 calls/day during snowstorms with error rate of only 1%.

ITS Project Profile:
Strait Crossing Bridge Limited Confederation Bridge Traffic Surveillance and Management System

OBJECTIVES:

- Enhance safety and security for bridge users.
- Enhance safety for bridge work crews.

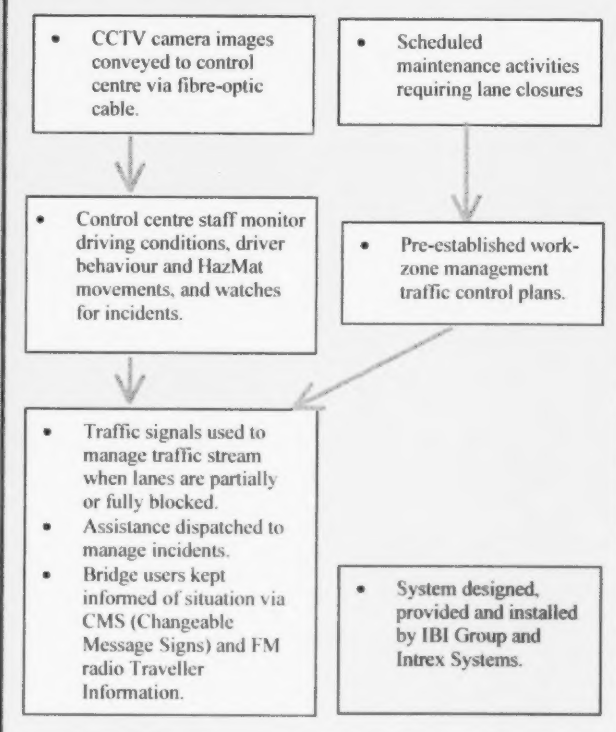
SOLUTION:

- Complete coverage of bridge with CCTV surveillance cameras.
- Traffic control system incorporating CMS (Changeable Message Signs) at either end of bridge, traffic signals every 1,500 metres, and variable speed limit signs.
- Emergency call boxes every 750 metres.
- 2 RWIS sites.
- Traveller information radio service
- Central control centre connected to all cameras and control equipment.

CURRENT STATUS:

- System is fully operational.
- Recently installed additional cameras to enhance coverage.
- Adding Strait Pass commercial vehicle electronic toll collection in October 2002.

THE SYSTEM:



- CCTV camera images conveyed to control centre via fibre-optic cable.

- Control centre staff monitor driving conditions, driver behaviour and HazMat movements, and watches for incidents.

- Scheduled maintenance activities requiring lane closures

- Pre-established work-zone management traffic control plans.

- Traffic signals used to manage traffic stream when lanes are partially or fully blocked.
- Assistance dispatched to manage incidents.
- Bridge users kept informed of situation via CMS (Changeable Message Signs) and FM radio Traveller Information.

- System designed, provided and installed by IBI Group and Intrex Systems.

CONTEXT:

- **The Confederation Bridge is a vital economic connection to Prince Edward Island, providing a significantly faster and more reliable alternative to the ferries connecting the Island with New Brunswick.**

ITS Project Profile:
Halifax-Dartmouth Bridge Commission

"MacPass" Electronic Toll Payment
Bridge Traffic Management

OBJECTIVES:

- Enhance customer service by reducing service times and congestion at toll plazas.
- Increase toll plaza throughput to accommodate future demand.
- Reduce cost of toll collection.
- Safely operate reversible-lane

SOLUTION:

- A transponder-based, pre-paid electronic payment system.
- CMS (Changeable Message Signs) to regulate use of reversible lane and post speed advisories.

CURRENT STATUS:

- Fully operational on the Macdonald and MacKay bridges. Transponders interoperable with Saint John Harbour Pass and Cobequid Pass E-Pass.
- Number of transponders held locally is approaching 40,000.
- 36% of all toll payments use MacPass. Use by commercial vehicles is between 70% and 80%. Use by buses is over 90%.
- Toll plaza congestion has been reduced dramatically. Using MacPass takes 1-2 seconds compared to 9-12 seconds for a cash transaction.
- Transaction cost reduced to 6.5 cents.

FUTURE OPTIONS:

- Success of MacPass may allow tokens to be discontinued.

THE SYSTEM:

- Passive 'backscatter' transponders in vehicles read by overhead antennae.
- Toll deducted from pre-paid account. Drivers advised if account is low. There is also a voice-recognition-based telephone system to allow MacPass users to query their account status.

- Bridge deck condition sensors advise of potential for 'black-ice' conditions (20-minute warning).
- CMS (Changeable Message Signs) post speed advisories based on conditions. Other electronically-controlled signs regulate reversible lane use.

- Amtech supplied the toll collection system.

CONTEXT:

- The Macdonald and MacKay bridges connect Halifax and Dartmouth across the Halifax Harbour.
- Approximately 31 million vehicles cross the bridges annually.

ITS Project Profile:
Halifax Regional Municipality

SCOOT Advanced Traffic Signal Control System

OBJECTIVES:

- Reduce delay to road users.
- Improve performance of traffic signal system. Need to optimize operation since physical expansion is constrained in mature areas of City.
- Reduce staff resource requirements associated with updating signal-timing plans.

SOLUTION:

- Implementation of SCOOT advanced traffic control system to improve response to changing traffic conditions and enhance traffic signal coordination.

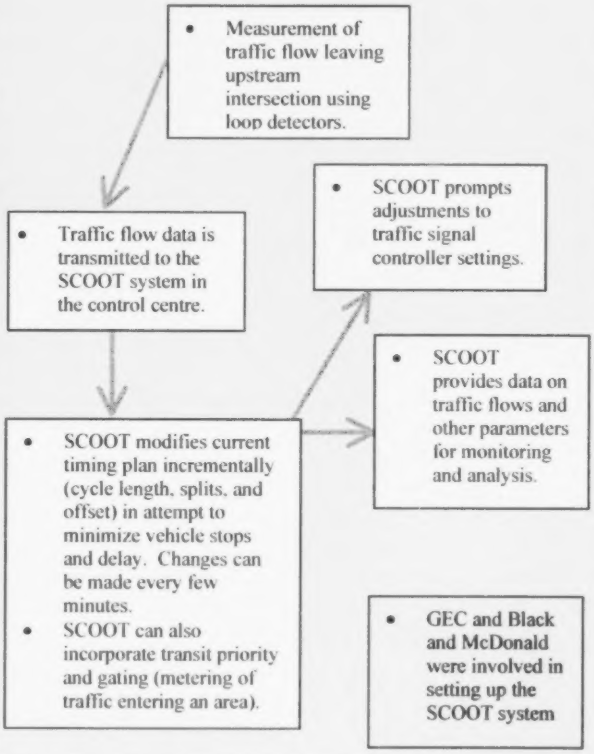
CURRENT STATUS:

- Operational since 1991.
- Benefit in terms of delay reduction to road users is most noticeable when system is down.
- Estimate $2-3 million in fuel savings over 3 years.

FUTURE OPTIONS:

- Expand geographical coverage of system.
- More fully utilize advanced features of SCOOT such as transit priority and gating.
- More fully utilize data outputs from SCOOT.

THE SYSTEM:



- Measurement of traffic flow leaving upstream intersection using loop detectors.

- Traffic flow data is transmitted to the SCOOT system in the control centre.

- SCOOT modifies current timing plan incrementally (cycle length, splits, and offset) in attempt to minimize vehicle stops and delay. Changes can be made every few minutes.
- SCOOT can also incorporate transit priority and gating (metering of traffic entering an area).

- SCOOT prompts adjustments to traffic signal controller settings.

- SCOOT provides data on traffic flows and other parameters for monitoring and analysis.

- GEC and Black and McDonald were involved in setting up the SCOOT system

Context:

- SCOOT operates approximately 90 of 98 total traffic signals on the road system of the Halifax Regional Municipality within the limits of the former City of Halifax.

ITS Project Profile:
Province of New Brunswick

Commercial Vehicle Weigh-in-Motion (WIM) System at Longs Creek on Route 2.

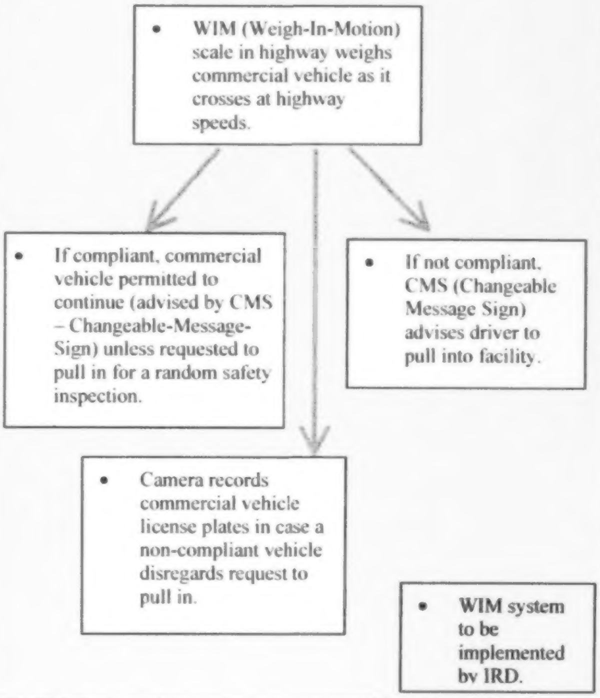
OBJECTIVES:
- Improve compliance with maximum commercial vehicle weight regulations at the Longs Creek facility on Route 2. The new highway alignment is not visible from the existing weighing facility and control room. WIM is an alternative to relocating the existing control facility.
- Reduce delay for commercial highway users and increase throughput and capacity.
- Increase safety for other road users.
- Utilize this installation as a pilot project to evaluate business case for more widespread implementation of WIM (Weigh-In-Motion) technology.

SOLUTION:
- WIM (Weigh-In-Motion) installation to allow vehicles to be weighed at highway speeds.
- Camera-based enforcement.

CURRENT STATUS:
- Project has been awarded.
- Expected to be fully operational by the summer of 2002.

FUTURE OPTIONS:
- Application to other weighing facilities.
- Combine with electronic vehicle safety credentialing.

THE SYSTEM:



- WIM (Weigh-In-Motion) scale in highway weighs commercial vehicle as it crosses at highway speeds.
- If compliant, commercial vehicle permitted to continue (advised by CMS – Changeable-Message-Sign) unless requested to pull in for a random safety inspection.
- If not compliant, CMS (Changeable Message Sign) advises driver to pull into facility.
- Camera records commercial vehicle license plates in case a non-compliant vehicle disregards request to pull in.
- WIM system to be implemented by IRD.

Context:
- An average of 860 vehicles per day are currently weighed and/or inspected at the Longs Creek facility.

ITS Project Profile:

Governments of New Brunswick, Newfoundland & Labrador, Nova Scotia, Prince Edward Island:

Tourist Information and Reservation Systems

OBJECTIVES:

- Increase attractiveness of Atlantic Provinces by providing access to up-to-date information on accommodation, travelling conditions, ferry services, activities, events, etc.
- Improve convenience of making reservations for ferries, accommodation, events, etc.

SOLUTION:

- Internet-based tourist and traveller information and reservation systems to supplement print and telephone services.

CURRENT STATUS:

- Each of the four Atlantic Provinces has a fully operational web-site which includes some or all of the following:
- travel and accommodations information
- travel conditions
- accommodation, event reservations
- ferry schedules and reservations
- vacation planning.
- and more!

THE WEB-SITES:

ITS Project Profile:
Province of Nova Scotia

“Smart” snowplow

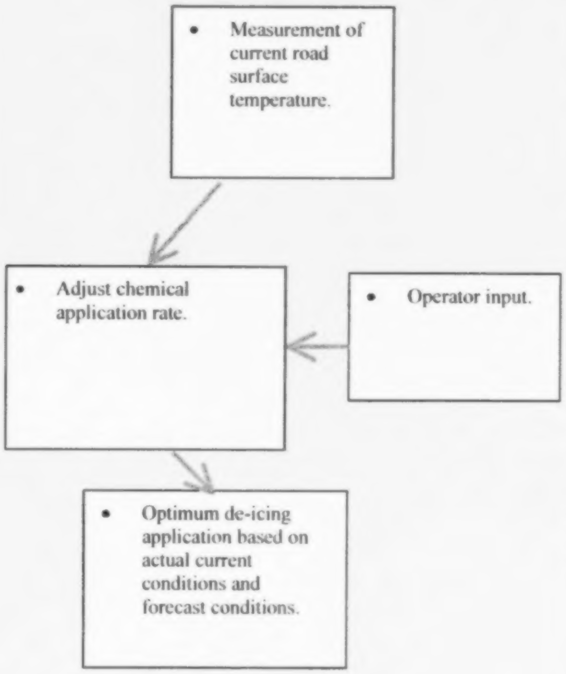
OBJECTIVES:
- Provide improved level of service for winter maintenance.
- Reduce salt usage.
- Reduce impact on the environment.

SOLUTION:
- Road temperature sensor.
- Computerized salt control.

CURRENT STATUS:
- Of the fleet of 24 plows, 4 are outfitted, with plans to upgrade 3 more in 2002/03

FUTURE OPTIONS:
- Integration of plough operations and fleet management with RWIS and forecasting.

THE SYSTEM:



- Measurement of current road surface temperature.
- Adjust chemical application rate.
- Operator input.
- Optimum de-icing application based on actual current conditions and forecast conditions.

Context:
- Currently servicing the high volume roads in the Halifax area, representing 225km of coverage, expanding to 400km in 2002/03.

APPENDIX Q

Showcased Atlantic Provinces ITS Company Profiles

Appendix Q – Showcased Atlantic Provinces ITS Company Profiles

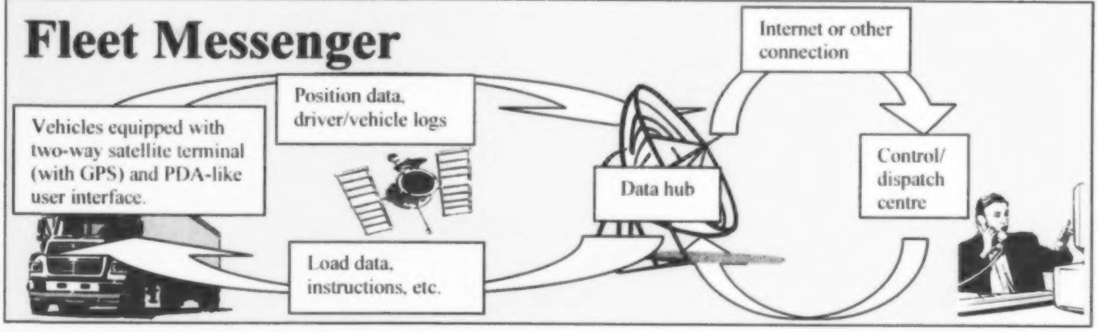
COMPANY INFO:

- Employs 55
- 24 years in business
- Headquartered in Dartmouth, Nova Scotia
- Seimac is a developer and integrator, packaging systems, designing/customizing or assembling electronics, developing software, out-sourcing sensors and other components.
- Information on market geography is not available.

ITS Company Profile:

Seimac Limited

Fleet Messenger



Internet or other connection

Position data, driver/vehicle logs

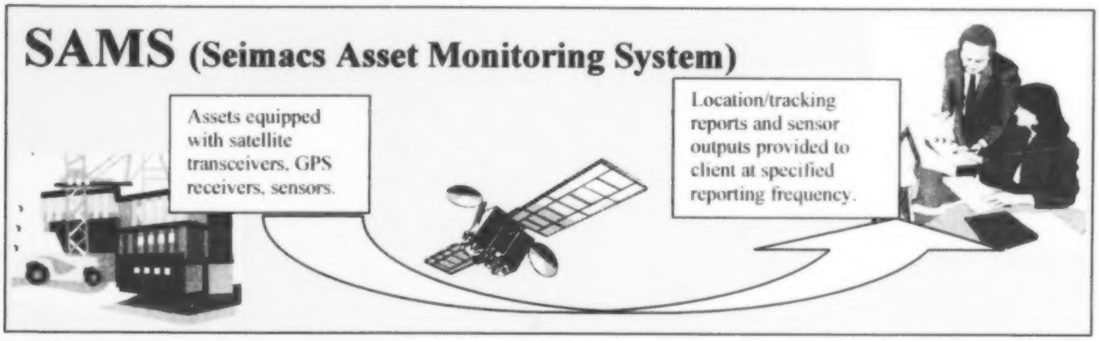
Vehicles equipped with two-way satellite terminal (with GPS) and PDA-like user interface.

Data hub

Control/ dispatch centre

Load data, instructions, etc.

SAMS (Seimacs Asset Monitoring System)



Assets equipped with satellite transceivers, GPS receivers, sensors.

Location/tracking reports and sensor outputs provided to client at specified reporting frequency.

Meteorological forecasting for RWIS

(Road Weather Information Systems)

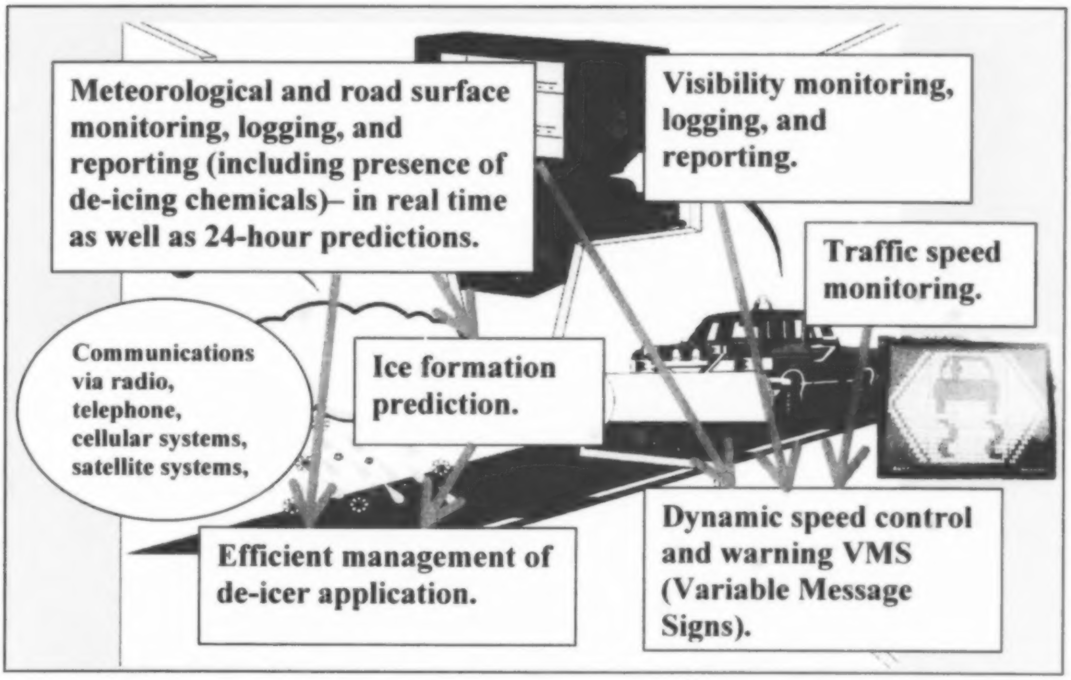
Prediction of snowfall and road-surface ice formation is based on local climate information from RWIS stations to enable timely deployment and effective management of winter maintenance assets.

ITS Company Profile:

Approach Navigation Systems Inc.

COMPANY INFO:

- Employs 6
- 6 years in business
- Headquartered in Dieppe, New Brunswick
- ANS is an integrator, assembler, installer, and project engineer for RWIS and related systems (most of their activity, however, is in field of air navigation and landing systems)
- 25% of market is in Atlantic Region, 15% is across Canada, remainder is international.



Meteorological and road surface monitoring, logging, and reporting (including presence of de-icing chemicals)– in real time as well as 24-hour predictions.

Visibility monitoring, logging, and reporting.

Traffic speed monitoring.

Communications via radio, telephone, cellular systems, satellite systems,

Ice formation prediction.

Efficient management of de-icer application.

Dynamic speed control and warning VMS (Variable Message Signs).

Other capabilities in VMS (Variable Message Signs), vehicle tag locating and monitoring, traffic flow and speed monitoring, CCTV monitoring. Hazmat incident response, and related training and maintenance.

COMPANY INFO:

- Employs 15
- 14 years in business
- Headquartered in Fredericton, New Brunswick
- Geoplan provides geomatics services and collaborates on turnkey solutions.
- 25% of market is in Atlantic Region, the remainder is across Canada.

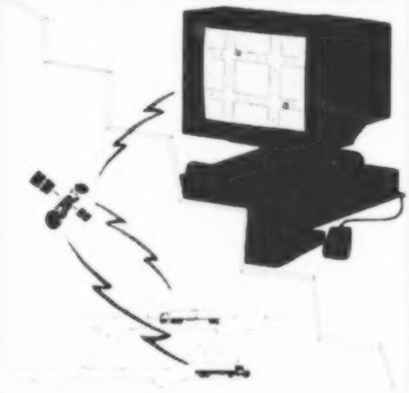
ITS Company Profile:

Geoplan Consultants Inc.

ITS-related Geomatics services

GIS/GPS requirements for fuel delivery route optimization (with University of New Brunswick).

Development of functional requirements for pupil transportation routing and scheduling system.



Development of architectures and implementation of spatially-enabled (GIS-based) data warehouse environments.

Conceptual development, standards, technical requirements, maintenance procedures, implementation strategies and civic addressing/mapping in support of enhanced 9-1-1 initiatives.

Other road network GIS and mapping requirements identification, standards, procedures, and implementation.

COMPANY INFO:

- 30 partners and associates across Canada.
- Based in Charlottetown, PEI.
- Specialize in customized e-learning solutions.
- Majority of projects in Atlantic Canada; with activities elsewhere in Canada and the U.S.

ITS Company Profile:

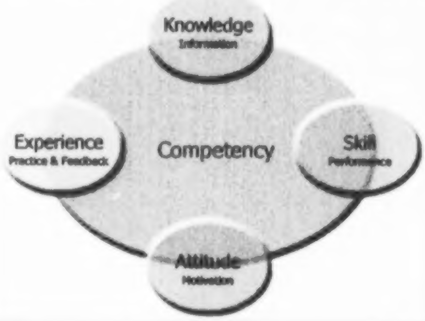
Future Learning Inc.

Computer-Based Winter Operations Training

Computer-based online training program to embrace skills in winter road operations/maintenance.

Modular and flexible to target needs of user group, with online accessibility anyplace, anytime.

Elements of a competency



Competency-based approach includes:

- Identify winter operations.
- Conduct competency analysis
- Expert input from operators and managers.
- Scan of information sources.
- Creation of competency skills chart.
- Groups skills into logical clusters for training modules.

Competency/skill approach applicable in many ITS areas:

- Driving simulation.
- ATMS/incident management.
- Fleet management/dispatch.
- Emergency preparedness.

APPENDIX R

User Services Suited for Atlantic Canada

Appendix R – User Services Suited for Atlantic Canada

User Services Suited for Atlantic Canada

	User Service	Description	Key Enabling Technologies
1.1	Traveller Information	Provides travellers with information prior to their departure to assist them in making mode choices, travel time estimates, and route decisions	Fundamental: Inductive loops, Video imaging or Radar; Driver, traveller, operator interface; Personal Communication Service or Microwave; Broadcast Communications; Fixed Wireline Communications Secondary: Environmental sensors; GPS; Route selection and guidance
1.4	Traveller Services and Reservation	Provides the traveller with access to "yellow pages" type information regarding a variety of travel-related services and facilities. The information will be accessible to the traveller in the home or office to support pre-trip planning and while enroute, either in the vehicle or at public facilities such as public transit terminals or highway rest stops.	Fundamental: Driver, traveller, operator interface; Personal Communication Service or Microwave; Fixed Wireline Communications Secondary: GPS; Route selection and guidance
2.1	Traffic Control	Manages the movement of traffic on streets and highways. It includes surface street controls such as traffic signal systems, adaptive traffic control systems and freeway control techniques such as ramp metering and lane control.	Fundamental: Inductive loops, Video imaging or Radar; UTC systems, Rotating drum, LED or Hybrid Displays; Operator interface; Fixed Wireline Communications; Lane Control and Ramp Metering Secondary: Environmental sensors; CCTV cameras; GPS; PCS or Microwave; Dedicated short range communications
2.2	Incident Management	Enhances existing capabilities to identify incidents, formulate response actions, and support initiation and ongoing co-ordination of those response actions.	Fundamental: Inductive loops, Video imaging or Radar; CCTV cameras; GPS; Rotating drum, LED or Hybrid Displays; Operator interface; Personal Communication Service or Microwave; Fixed Wireline Communications; Lane Control and Ramp Metering
2.4	Environmental Conditions Management	Provides government agencies with the capability to enhance their air quality control strategies. The function provides both wide area and roadside emissions monitoring as well as Road Weather Systems and Services. Information is used by Traffic Demand Management in the Traffic Management Centre to mitigate pollution and may be provided to enforcement agencies to compel offenders to comply with standards.	Fundamental: Vehicle classification; Environmental sensors; Operators interface; Fixed Wireline Communications Secondary: CCTV cameras; Rotating drum, LED or Hybrid Displays; Driver interface; In-vehicle sensors; Personal Communication Service or Microwave
2.5	Operations and Maintenance	Provides government agencies, as well as contractors with the resources to manage the operations and maintenance of vehicle fleet and equipment assets, and monitor and manage traffic flow around work zone areas.	Fundamental: Environmental sensors; CCTV cameras; GPS; Personal Communication Service or Microwave Secondary: Inductive loops, Video imaging or Radar; Driver monitoring sensors; UTC systems; Rotating drum, LED or Hybrid Displays; Vehicle control sensors; Driver and operators interface; In-vehicle sensors; Lane Control and Ramp Metering
2.6	Automated Dynamic Warning and Enforcement	Provides systems which warn vehicles or motorists of imminent danger, and provide electronic enforcement of traffic control and regulations.	Fundamental: Inductive loops, Video imaging or Radar; Environmental sensors; UTC systems; Rotating drum, LED or Hybrid Displays; Lane Control and Ramp Metering
3.1	Public Transport Management	Applies advanced vehicle electronic systems to various public transportation modes and uses the data generated by these modes to improve service to the public. It includes operation of vehicles	Fundamental: GPS; Operator interface; Personal Communication Service or Microwave Secondary: CCTV cameras; Driver monitoring sensors; Driver, traveller interface; In-vehicle sensors; Dedicated

	User Service	Description	Key Enabling Technologies
		and facilities, planning and scheduling, and personnel management.	short range communications
4.1	Toll Roads, Parking and Transit	Allows travellers to pay for transportation services by electronic means. The following functionality is provided: Electronic Toll Collection, Electronic Fare Collection, Electronic Parking Payment, and Electronic Payment Services Integration. It may also serve broad non-transportation functions and may be integrated with credit and debit cards in banking and other financial transactions.	Fundamental: Security sensors; Dedicated short range communications; Fixed Wireline Communications Secondary: GPS; Personal Communication Service or Microwave
5.1	Commercial Vehicle Electronic Clearance	Consists of both domestic and international border electronic clearances. As a vehicle approaches an inspection station or checkpoint, vehicle to roadside communications take place that identify the vehicle and make available to authorities the necessary data about credentials, vehicle weight, safety status, cargo, and occupants. Enforcement personnel can select potentially unsafe vehicles for inspection and allow safe and legal vehicles to bypass the inspection.	Fundamental: Rotating drum, LED or Hybrid Displays; Driver and operators interface; Dedicated short range communications; Fixed Wireline Communications; Lane Control and Ramp Metering Secondary: Vehicle classification; CCTV cameras; Cargo monitoring sensors; Security sensors; Route selection and guidance; In-vehicle sensors; Personal Communication Service or Microwave
5.5	Intermodal Freight Management	Provides systems which will monitor the status of freight in-transit, and at freight terminals.	Fundamental: Cargo monitoring sensors; Security sensors; GPS; Driver and operators interface; Personal Communication Service or Microwave; Dedicated short range communications Secondary: CCTV cameras
5.6	Commercial Fleet Management	Provides real-time communications for vehicle location, dispatching and tracking between commercial vehicle drivers, dispatchers, and intermodal transportation providers, thereby reducing delays for drivers and providing commercial drivers and dispatchers with real-time routing information in response to congestion or incidents. Commercial fleet management includes the management of taxi fleets.	Fundamental: CCTV cameras; GPS; Driver and operators interface; Personal Communication Service or Microwave; Dedicated short range communications Secondary: Security sensors; In-vehicle sensors; Fixed Wireline Communications
6.1	Emergency Notification and Personal Safety	Provides the capability for the user to manually initiate a distress signal for incidents like mechanical breakdown or non-injury collisions.	Fundamental: GPS; Driver, traveller, operator interface; Personal Communication Service or Microwave; Fixed Wireline Communications Secondary: Vehicle classification
6.3	Disaster Response and Management	Co-ordinates disaster response strategies from a virtual control centre, and disseminates information to agencies and individuals on traffic conditions, diversion routes etc.	Fundamental: Security sensors; Fixed wireline communications Secondary: Personal Communication Service or Microwave
6.4	Emergency Vehicle Management	Oriented towards reducing the time from the receipt of notification of an incident by an emergency services dispatcher, and the arrival of emergency vehicles on the scene. It includes emergency vehicle fleet management, route guidance to the incident scene or a suitable hospital, and pre-emption of traffic signals on an emergency vehicle's route to receive more green displays.	Fundamental: Security sensors; GPS; Driver and operators interface; Personal Communication Service or Microwave; Fixed Wireline Communications Secondary: CCTV cameras; Route selection and guidance; In-vehicle sensors; Dedicated short range communications

Appendix R – User Services Suited for Atlantic Canada

	User Service	Description	Key Enabling Technologies
8.1	Weather and Environmental Data	Provides system wide gathering, fusion, and dissemination of information on roadway weather conditions and forecasts.	Fundamental: Environmental sensors; Fixed wireline communications Secondary: Broadcast communications

APPENDIX S

Transport Canada ITS Partnerships 2002 Awards

Appendix S – Transport Canada ITS Partnerships 2002 Awards

Canada's Intelligent Transportation Systems (ITS)
Proposals Selected for Funding for Fiscal Years 2002-03 to 2003-04

Funding Recipient and Project Description	Federal Funding
Vancouver Port Authority: Enhance and expand the PortView software to include the movement of dangerous goods in and out of port jurisdictions in British Columbia (Phase II - CoastView).	$200,000
British Columbia Ministry of Transportation: Deploy a southbound Advanced Traveller Information System (ATIS) at the Peace Arch and Pacific Highway border crossings in Surrey, British Columbia. Partners include B.C. Ministry of Transportation, B.C. Transportation Financing Authority, U.S. Department of Transportation, and Canada Customs and Revenue Agency.	$250,000
Alberta Ministry of Transportation: Assess and develop an Advanced Traveller Information and Traffic Management Systems Blueprint for Highway 2 between Edmonton and Calgary.	$250,000
Alberta Ministry of Transportation: Deploy Variable Message Signs along Highway 2 in the vicinity of Red Deer.	$250,000
The City of Edmonton: Deploy a video traffic management system that provides information to various departments and a traveller information system that provides live and still image data via cable television and Internet. Partners include the City of Edmonton, IBI Group, EPCOR, Shaw Communications, and the City of St. Albert.	$250,000
The City of Calgary: Expand the Traffic Signal Priority (TSP) System and the Automatic Vehicle Tracking System (AVTS) for Calgary Transit Buses, Phase II.	$250,000
The City of Saskatoon: Modernize traffic signal technology, through the deployment of an Advanced Traffic Management System. Partners include the City of Saskatoon, Fortran Traffic Systems, and Naztec Inc.	$250,000
The City of Toronto: Establish a Road Access and Disruption Management Program (ROADMAP) system to manage disruptions to the arterial and expressway road network in the City of Toronto. Partners include the City of Toronto, IBI Group, and Fortran Traffic Systems.	$250,000

Appendix S – Transport Canada ITS Partnerships 2002 Awards

Funding Recipient and Project Description	Federal Funding
GO Transit: Develop and deploy a Rail Operations Information Network to monitor GO Transit's rail operations and to distribute the information on service status to passengers, GO Transit staff, and business staff. Partners include GO Transit and Delcan Corporation.	$250,000
GO Transit: Enhance GO Transit's smart card-based fare collection system to prepare it for use by other transit service providers in the Greater Toronto Area. Partners include GO Transit, Roderick McDougal Ltd., ERG Transit Systems, and Toronto Area Municipalities.	$243,425
York Region Transportation and Works Department: Design and deploy a Transit Priority System along selected transit routes operated by the region. Partners include the York Region and LEA Consulting Ltd.	$250,000
The Regional Municipality of Durham: Develop an Incident Management System for Brock Road, the eastern terminus of Highway 407 ETR and the primary link to Highway 401 east of the City of Toronto. Partners include the Regional Municipality of Durham, IBI Group, Fortran Traffic Systems, Globe Network Integrators and Guild Electric.	$250,000
The City of Ottawa - Transit Services: Deploy an Intelligent Transit Vehicle Subsystem to enhance vehicle tracking and schedule adherence.	$250,000
Agence métropolitaine de transport: Conduct a strategic plan study on an automated real-time system for determining traffic delays.	$250,000
L-P Tardif & Associés Inc: Deploy an ITS system to help school bus drivers detect children near school buses. Partners include the Quebec Bus Owners Association and Quebec Ministry of Transportation.	$90,385
Technologies Lynx: Evaluate an automated system for detecting traffic incidents. Partners include Technologies Lynx, Gestion Paul R. Ouimet Inc., Citilog, and the Quebec Ministry of Transportation.	$98,700
Strait Crossing Development Inc.: Deploy an electronic payment system on the Confederation Bridge.	$93,500

Total Funding = $3,726,010

APPENDIX T

U.S. Department of Transportation Fiscal Year 2002 ITS Allocations

Appendix T – U.S. Department of Transportation Fiscal Year 2002 ITS Allocations

U.S. DOT Fiscal Year 2002 ITS Allocations

State		Amount	Rural	Border/ Corridor	Small Urban	Large Urban	Other
AK	Alaska Statewide	2500000	✓				
AL	Automated Crash Notification System, UAB, Alabama	2500000	✓				
AZ	Arizona statewide EMS	500000	✓				
AZ	University of Arizona ATLAS Center, Arizona	500000					✓
CA	Alameda-Contra Costa, California	500000				✓	
CA	Chinatown intermodal transportation center, California	1750000				✓	
CA	Inglewood, California	500000			✓		
CA	Monterey-Salinas, California	750000			✓		
CA	Port of Long Beach, California	500000				✓	
CA	Sacramento, California	3000000				✓	
CA	San Diego joint transportation operations center, California	1500000				✓	
CA	San Francisco central control communications, California	250000				✓	
CA	Santa Anita, California	300000			✓		
CA	Silicon Valley transportation management center, California	700000				✓	
CO	Southeast Corridor, Colorado	7000000		✓			
DC	Washington, DC metropolitan region	2000000				✓	
DE	Integrated transportation management system, Delaware statewide	2000000				✓	
FL	Bay County Area wide traffic signal system, Florida	500000				✓	
FL	Miami-Dade, Florida	1000000				✓	
GA	Atlanta smart corridors, Georgia	1000000				✓	
HI	Hawaii statewide	1000000	✓				
ID	Moscow, Idaho	1000000	✓		✓		
IL	Army trail road traffic signal coordination project, Illinois	300000			✓		
IL	Illinois statewide	2000000	✓				
IL	Libertyville traffic management center, Illinois	760000			✓		
IN	Hoosier SAFE-T, Indiana	2000000	✓				
IA	Iowa Statewide	562000	✓				
KS	Wichita, Kansas	1200000				✓	
KS	Kansas City, Kansas	500000				✓	
KY	Eastern Kentucky rural highway information	2000000	✓				
KY	Lexington, Kentucky	750000				✓	
KY	Statewide transportation operations center, Kentucky	2000000	✓				
LA	Houma, Louisiana	1000000	✓		✓		
LA	Shreveport, Louisiana	750000	✓		✓		
MA	Pioneer Valley, Massachusetts	1500000	✓		✓		
MD	Maryland statewide	1000000	✓		✓		
MD	Montgomery County ECC & TMC, Maryland	1000000				✓	
ME	Maine statewide (rural)	500000	✓				
MI	Detroit, Michigan (airport)	1500000				✓	
MI	Genesee County, Michigan	1000000	✓		✓		
MI	Great Lakes, Michigan	1500000	✓		✓		
MI	Lansing, Michigan	750000				✓	
MI	Macomb, Michigan (border crossing)	1000000	✓	✓		✓	
MI	St. Louis Missouri	1000000				✓	
MI	Wayne County road information management system, Michigan	1500000	✓				

Appendix T – U.S. Department of Transportation Fiscal Year 2002 ITS Allocations

State		Amount	Rural	Border/ Corridor	Small Urban	Large Urban	Other
MN	Guidestar, Minnesota	6000000				✓	
MS	Harrison County, Mississippi	500000	✓		✓		
MS	Jackson Metropolitan, Mississippi	500000	✓		✓		
MS	Oxford, Mississippi	500000	✓		✓		
MS	Spillway road incident management system, Mississippi	600000	✓				
MT	Roadside animal detection test-bed, Montana	500000	✓				
NC	Durham, Wake Counties, North Carolina	500000	✓		✓		
NC	Forsyth, Guilford Counties, North Carolina	1000000	✓		✓		
ND	Fargo, North Dakota	1000000	✓		✓		
NE	Nebraska statewide	4000000	✓				
NM	Santa Teresa, New Mexico	750000	✓	✓			
NV	Las Vegas, Nevada	1450000				✓	
NV	Southern Nevada (bus)	1100000	✓				
NY	Cargo mater logistics and intermodal management, New York	1250000					✓
NY	Commercial vehicle information systems and networks, New York	450000	✓				✓
NY	I-90 connector testbed, New York	1000000	✓	✓			
NY	Long Island rail road grade crossing deployment, New York	1000000					✓
NY	New York Statewide information exchange systems, New York	500000	✓		✓		
NY	New York, New Jersey, Connecticut (TRANSCOM)	2500000				✓	
NY	North Greenbush, New York	1000000	✓		✓		
NY	Rochester-Genesse, New York	800000			✓		
OH	Central Ohio	1500000	✓		✓		
OH	Dayton, Ohio	1250000			✓		
OK	Oklahoma statewide	3000000	✓		✓		
PA	Beaver County transit mobility manager, Pennsylvania	800000	✓		✓		
PA	Carbondale technology transfer center, Pennsylvania	1000000					✓
PA	Pennsylvania statewide (turnpike)	500000	✓				
PA	Philadelphia, Pennsylvania	1033000				✓	
PA	Philadelphia, Pennsylvania (Drexel)	1500000				✓	
SC	South Carolina DOT	3000000	✓				
SD	Travel Network, South Dakota	2325000	✓				
TN	Chattanooga, Tennessee	2000000			✓		
TX	Austin, Texas	125000				✓	
TX	Brownsville, Texas	250000			✓		
TX	Texas statewide	2000000	✓				
UT	Utah statewide	560000	✓		✓		
VA	Alexandria, Virginia	750000			✓		
VA	James Madison University, Virginia	1500000					✓
VT	Rutland, Vermont	750000	✓		✓		
VT	Vermont statewide (rural)	1500000	✓		✓		
WA	Clark County, Washington	1000000			✓		
WA	Kittitas County workzone traffic safety system, Washington	450000	✓				
WA	Port of Tacoma trucker congestion notification system, Washington	200000					
WA	Washington statewide	4500000	✓		✓		
WA	Yakima County adverse weather operations, Washington	475000	✓				
WI	Superior, I-39 corridor, Wisconsin	2500000	✓	✓			
WI	Wisconsin communications network	310000	✓				
WI	Wisconsin statewide	1000000	✓				

APPENDIX U

ITS America's Ten-Year Vision for the National ITS Program: Programmatic Themes

Appendix U – ITS America's Ten-Year Vision for the National ITS Program: Programmatic Themes

ITS America's Ten-Year Vision for the National ITS Program: Programmatic Themes

Programmatic Theme #1: An Integrated Network of Transportation Information		
That: • gathers, analyzes and stores the data and interacts with adjoining external systems	Will allow for: • improved traveller information • better coordination between agencies • a single payment medium for regional and national travel • easier data/information-sharing to support safety, security, productivity, mobility and environmental goals	Will require: • new partnerships within and between the public and private sectors in the broadest sense, including manufacturers, carriers, service providers and travellers • research into traveller behaviour, responsiveness to new information, and the type/quality of data that would be most useful • assuring the public safety community of a high level of communication and interface to support emergency and disaster response
Programmatic Theme #2: Advanced Crash Avoidance Technologies		
Will lead to: • development, integration and deployment of a new in-vehicle electronics to prevent crashes and reduce their severity • mechanisms that determine fitness to drive • selective automated enforcement	Will permit deployment of: • driver assistance products such as curve speed warning, collision warning, adaptive cruise control, stability control, traction control and lane departure warning • active safety products such as forward and rear collision avoidance, intersection collision avoidance and lane departure prevention	Will require: • addressing manufacturers' proprietary and competitive concerns • research and public-private cooperation to assure that safety systems operate consistently and expectedly and do not distract the driver • mounting a public outreach and education campaign on the safety, efficiency and mobility benefits of new ITS products and how to use them properly
Programmatic Theme #3: Automatic Crash & Incident Detection, Notification and Response		
Will lead to: • faster and more reliable incident detection and notification • improved incident response time through more efficient dispatch operations and emergency vehicle movement through traffic	Will permit: • getting help to and clearing an accident more swiftly, thus minimizing additional congestion without compromising care for the injured • more appropriate response to incidents based on better information regarding the severity, location and nature of the injuries • direct links emergency medical services through real-time voice, visual and data communications	Will require: • developing programs and funding mechanisms to stimulate cooperation between public and private communications organizations, the widespread deployment of onboard collision notification devices, and better progress toward a nationwide wireless enhanced 911 network

Appendix U – ITS America's Ten-Year Vision for the National ITS Program: Programmatic Themes

Programmatic Theme #4: Advanced Transportation Management		
Will permit:	Will lead to:	Will require:
• real-time surveillance and detection of incidents • infrastructure and vehicles to communicate and cooperate more effectively • rapid acquisition and analysis of flow data • real-time operational responses to current and projected flows and conditions • continuous capability during times of crisis or infrastructure destruction • prediction of near-term transportation system conditions	• reduced congestion and more freely flowing traffic • safer work zones and highway-rail intersections • improved management of travel speeds in anticipation of or in reaction to changing weather conditions • clearing incidents more quickly, thereby reducing congestion	• research of information technologies to create a smarter infrastructure, including better sensors, using vehicles as sources of traffic and road condition information, and opportunities for promoting vehicle-infrastructure cooperation • coordinating and funding the transformation of research results into guidelines, best practices and standards • establishing a mechanism for cooperation among public agencies, private industry and the research community to pursue research on Cooperative Vehicle-Highway Automation Systems • R&D that focuses on automating commercial road maintenance, and public transportation vehicles in dedicated guideways

APPENDIX V

ITS America's Ten-Year Vision for the National ITS Program: Enabling Themes

Appendix V – ITS America's Ten-Year Vision for the National ITS Program: Enabling Themes

ITS America's Ten-Year Vision for the National ITS Program: Enabling Themes

Enabling Theme #1: Creating a Culture of Transportation Systems Management and Operations		
Will permit: • a multi-disciplinary approach to transportation system management and operations • high levels of cooperation among neighbouring jurisdictions • an expanded focus on performance and customer service • new forms of cooperation between the public and private sector	Will lead to: • a broader set of alliances among product and service suppliers focusing on interoperability issues • management and control facilities coordinated locally, regionally and/or nationally across modes by both private and public service providers • a shift in transportation infrastructure and vehicle-related service providers away from product and facility outputs to performance improvement outcomes	Will require: • focusing research on how the technologies or applications can be coordinated and integrated, as well as on technologies to address specific problems • providing more help to the ITS and planning communities to adjust to an operations orientation, including practical methods of handling ITS capital and operating-resource issues
Enabling Theme #2: New Public Sector Roles, Relationships and Funding		
Will permit: • cooperative relations between public and private sector organizations, that promote safety, efficiency and productivity of travel • travelers to benefit from more seamless management of the transportation system	Will lead to: • combining public and private investments to create a mix of technology and operational infrastructure not obtainable through public or private sponsorship alone • alternative pricing strategies to make collecting revenues simpler	Will require: • rethinking methods for procurement and management of private sector services by public agencies • encouraging the creation of regional operating organizations • studying and modernizing the workforce requirements to support emerging organizations and institutions
Enabling Theme #3: New Federal Policies and Initiatives to Achieve Extensive Private Sector Product Deployment		
The private sector will: • provide products and services to satisfy government, business and consumer requirements • partner with governments in the development or delivery of transportation services • be innovators in designing new approaches to transportation issues through R&D of new products, systems and services, relationships and business	Will lead to: • revising procurement rules to allow more efficient purchase of ITS products by government agencies • exploring the best methods for delivering accurate and useful real-time information • the sharing of information among all relevant parties while maintaining the privacy of individual drivers	Will require: • enhanced outreach to underscore the value of mobile information and communications systems in providing safer and more efficient travel • greater public access • early adoption to create a lower-risk environment for adoption, generating early sales volume and helping to lower the cost for the general public of adopting ITS technology • possibly introducing creative user incentives to those that purchase ITS products and services • barrier removal
Enabling Theme #4: A Focus on Human Factors		
Will permit: • the rollout of safe and usable ITS products and services for all users • reducing the liability	Will lead to: • determining the level of workload associated with secondary tasks • understanding the attention, workload and distraction issues for professional versus	Will require: • making the study of transportation/ITS human factors an issue of national concern and importance • creating a national coalition of public

concerns that designers and manufacturers face	private vehicle drivers • harmonization of external and in-vehicle signs and signals • orchestrating consistency of in-vehicle warnings across all vehicles • presentation of traveler information in a way that maximizes usefulness and minimizes confusion	and private stakeholders to take responsibility for exploring and setting guidelines for ITS-related human factors

APPENDIX W

Potential ITS Providers by User Service Bundles

Appendix W – ITS User Service Bundles

The following pages contain tables summarizing the current and potential involvement of Atlantic Canada companies in the different ITS User Service Bundles.

The table's columns are defined as:

- *'Years'* refers to the number of years the company has been in existence.
- *'Employees'* refers to the number of people employed by the company.
- *'% out of Region'* refers to the percentage of the company's business that is outside of the Atlantic region.
- *'% out of Canada'* refers to the percentage of the company's business that is outside of Canada.
- *'Applicability to ITS'* refers to how easily applicable the work done by the company is to fields in ITS. A solid circle (●) indicates that the majority of work done by the company is in ITS. A partially filled circle (◐) indicates that a minority of work done by the company is in ITS, and/or that the majority of what is being done is easily transferred to ITS. An empty circle (○) indicates that the company does no ITS work, but that transferring the results to ITS is feasible.
- *'Research/Product Development'* refers to whether or not the company's work relates to research and/or product development.
- *'Manufacturing'* refers to whether or not the company's work relates to manufacturing.
- *'Installation/System Integration'* refers to whether or not the company's work relates to installation and/or system integration.
- *'Consulting'* refers to whether or not the company performs consulting-related services.

Company stability

The first two variables 'Years', and 'Employees', are the primary indicators of company stability. The more established a company is (i.e. the more years its been in operation), and the larger the number of employees it has, the less likely it is to dramatically change its output level. In addition to the primary indicators, the percentage of work done outside of the Atlantic region/Canada also influences stability. Generally, the larger the company's market, the less susceptible it is to regional ups and downs in the economy. Finally, company's involved in the manufacturing sector are likely more stable because of the large capital investment that is required.

Extra-regional foothold

The percentage of work performed outside of the Atlantic region and Canada are the two primary factors representing extra-regional foothold. Companies with a significant amount of previous work outside of the region will have an easier time expanding their Canadian and International presence in ITS. In addition to the two factors mentioned, the number of years the company has been in existence can be representative of the company's readiness to enter the Canadian and International markets.

Appendix W – ITS User Service Bundles

User Service Bundle 1: Traveller Information Services

- Consists of user services designed to use advanced systems and technologies to manage information to help drivers decide when to drive and the route to drive, as well as opportunities to reserve rides and other traveller services.

Company	Years	Employees	% out of Region	% out of Canada	Applicability to ITS	Research/ Product Development	Manufacturing	Installation/ System Integration	Consulting
Accesstec Inc	7	27	100	65	●	✓		✓	✓
Delphi Systems Inc.	9	5	60	25	●				✓
Engineering Technologies Canada Ltd.	6	5	0	0	⭘	✓			✓
Enseignes Imperial Signs	39	400	15	*	⭘	✓		✓	✓
Geoplan Consultants Inc.	14	15	30	0	⭘	✓			✓
J. J. MacKay Canada Ltd.	40	150	*	*	●	✓	✓		✓
SGE Group Inc.	30	120	25	12	●	✓		✓	
SVG Consulting Inc.	2	2	60	35	●				✓
xwave	4	2800	50	20	●	✓	✓	✓	✓

User Service Bundle 2: Traffic Management Services

- Consists of user services designed to use advanced systems and technologies to improve the efficiency and operation of the existing surface transportation infrastructure and create safer conditions for travellers.

Company	Years	Employees	% out of Region	% out of Canada	Applicability to ITS	Research/ Product Development	Manufacturing	Installation/ System Integration	Consulting
ADI Group	46	200	15	0	●				✓
Approach Navigation Systems Inc.	6	6	75	60	⭘	✓		✓	✓
C-CORE	27	57	80	35	○	✓			✓
CARIS	22	150	*	65	●	✓			✓
Consolidated Technologies Ltd.	17	8	90	80	○	✓			✓
Delphi Systems Inc.	9	5	60	25	●				✓
DPL Group	17	80	80	50	●	✓		✓	
Engineering Technologies Canada Ltd.	6	5	0	0	⭘	✓			✓
Enseignes Imperial Signs	39	400	15	*	⭘	✓		✓	✓
Geoplan Consultants Inc.	14	15	30	0	⭘	✓			✓
Intrignia Solutions Inc.	2	3	*	*	○	✓		✓	✓
Jacques Whitford Environment	30	900	60	35	⭘				✓
Kinek Technologies	2	55	100	100	●	✓		✓	✓
Pinter Consulting Services Inc.	8	1	20	20	○	✓			✓
SGE Group Inc.	30	120	25	12	●	✓		✓	
Seimac Limited	24	55	*	*	●	✓	✓	✓	
Spatial Decision Support Systems Ltd.	8	3	0	0	⭘	✓			✓
SVG Consulting Inc.	2	2	60	35	●				✓
Trip Data & Safety Management Inc.	23	5	95	40	⭘	✓			✓

● = majority of work done is in ITS
⭘ = minority of work done is in ITS, and/or is easily transferred to ITS
○ = company does no ITS work, but transferring the results to ITS is feasible
* = no data available

User Service Bundle 3: Public Transport Services

- Relates to public transportation, which includes urban, suburban and rural transit in fixed route, route deviation and demand-responsive modes and operated by bus, heavy rail, light rail, commuter rail and van or carpool or shared ride taxi. All forms of short distance transportation not involving a single occupant automobile should benefit from these services.

Company	Years	Employees	% out of Region	% out of Canada	Applicability to ITS	Research/ Product Development	Manufacturing	Installation/ System Integration	Consulting
ADI Group	46	200	15	0	●				✓
Atlantic Data Group	25	25	70	10	○	✓		✓	✓
Baseline Business Geographics Inc	8	5	30	15	○	✓		✓	✓
CARIS	22	150	*	65	●	✓			✓
Delphi Systems Inc	9	5	60	25	●				✓
DPL Group	17	80	80	50	●	✓		✓	
Geoplan Consultants Inc	14	15	30	0	**○**	✓			✓
Intrignia Solutions Inc	2	3	*	*	○	✓		✓	✓
Kinek Technologies	2	55	100	100	●	✓		✓	✓
Pinter Consulting Services Inc	8	1	20	20	○	✓			✓
Seimac Limited	24	55	*	*	●	✓	✓	✓	
Spatial Decision Support Systems Ltd	8	3	0	0	**○**	✓			✓
SVG Consulting Inc	2	2	60	35	●				✓
Trip Data & Safety Management Inc	23	5	95	40	**○**	✓			✓

User Service Bundle: Electronic Payment Services

- Consists of one user service, Electronic Payment Services. This service bundle provides travellers with a common electronic payment medium for all transportation modes and services.

Company	Years	Employees	% out of Region	% out of Canada	Applicability to ITS	Research/ Product Development	Manufacturing	Installation/ System Integration	Consulting
AnyWare Group Inc	2	25	100	95	○	✓		✓	✓
Delphi Systems Inc	9	5	60	25	●				✓
J. J. MacKay Canada Ltd	40	150	*	*	●	✓	✓		✓
SGE Group Inc	30	120	25	12	●	✓		✓	
SVG Consulting Inc	2	2	60	35	●				✓

User Service Bundle 5: Commercial Vehicle Operations

- Is concerned primarily with freight movement and focuses on services which improve private sector fleet management and freight mobility, and which streamline government/regulatory functions.

Company	Years	Employees	% out of Region	% out of Canada	Applicability to ITS	Research/ Product Development	Manufacturing	Installation/ System Integration	Consulting
Advatek Systems Inc	15	8	10	10	⭘	✓	✓	✓	✓
ALT Group Inc	6	8-10	*	25	⭘	✓			✓
AMIRIX Systems Inc.	21	50	80	20	●	✓		✓	
Beltek Systems Design Inc	12	20	100	75	●	✓		✓	✓
Compusult Ltd	17	32	90	75	●	✓		✓	✓
Delphi Systems Inc.	9	5	60	25	●				✓
DPL Group	17	80	80	50	●	✓		✓	
Geonet Technologies Inc.	8	15	60	20	●	✓			✓
Geoplan Consultants inc	14	15	30	0	⭘	✓			✓
International Communications and Navigation Ltd.	6	23	85	55	○	✓		✓	✓
PEI Innovations Inc	3	6	95	85	●	✓	✓	✓	
Seimac Limited	24	55	*	*	●	✓	✓	✓	
SVG Consulting Inc	2	2	60	35	●				✓
Trip Data & Safety Management Inc	23	5	95	40	⭘	✓			✓

User Service Bundle 6: Emergency Management Services

- Contains user services that relate directly to the detection, notification and response to emergency and non-emergency incidents which take place on or adjacent to the roadway.

Company	Years	Employees	% out of Region	% out of Canada	Applicability to ITS	Research/ Product Development	Manufacturing	Installation/ System Integration	Consulting
Canpolar East Inc.	20	1	85	85	○	✓			
Delphi Systems Inc	9	5	60	25	●				✓
Geonet Technologies Inc	8	15	60	20	●	✓			✓
Geoplan Consultants Inc	14	15	30	0	⭘	✓			✓
Spatial Decision Support Systems Ltd	8	3	0	0	⭘	✓			✓
SVG Consulting Inc.	2	2	60	35	●				✓
xwave	4	2800	50	20	●	✓	✓	✓	✓

User Service Bundle 7: Vehicle Safety and Control Systems

- Relates primarily to the safety goals of ITS by having a direct impact on diminishing both the number and severity of collisions.

Company	Years	Employees	% out of Region	% out of Canada	Applicability to ITS	Research/ Product Development	Manufacturing	Installation/ System Integration	Consulting
Canpolar East Inc.	20	1	85	85	○	✓			
DPL Group	17	80	80	50	●	✓		✓	
Delphi Systems Inc.	9	5	60	25	●				✓
International Communications and Navigation Ltd.	6	23	85	55	○	✓		✓	✓
Intrignia Solutions Inc.	2	3	*	*	○	✓		✓	✓
Measurand Inc.	9	12	100	80	○	✓	✓		
PEI Innovations Inc.	3	6	95	85	●	✓	✓	✓	
SVG Consulting Inc.	2	2	60	35	●				✓

User Service Bundle 8: Information Warehousing Services

- Includes the gathering, fusion, and dissemination of weather and environmental data. It also includes the archiving and sharing of historical transportation data.

Company	Years	Employees	% out of Region	% out of Canada	Applicability to ITS	Research/ Product Development	Manufacturing	Installation/ System Integration	Consulting
Compusult Ltd.	17	32	90	75	●	✓		✓	✓
Consolidated Technologies Ltd.	17	8	90	80	○	✓			✓
Delphi Systems Inc.	9	5	60	25	●				✓
Satlantic Inc.	12	40	95	85	○	✓	✓	✓	
SVG Consulting Inc.	2	2	60	35	●				✓

APPENDIX X

Niche Areas

Appendix X – Niche Areas

Niche Areas

User Sub-Service	Description	Potential Providers	Other Comments
2.4.3 RWIS (Road Weather Information Systems)	Early detection and forecasting of environmental hazards (i.e. icy roads, dense fog, etc.). Based on this, one can more effectively deploy road maintenance resources, issue general traveller advisories, improve emergency management and response, and support location specific warnings to drivers.	• Approach Navigation Systems Inc.; • Jacques Whitford Environment; • Seimac Limited	Identified for internal deployment.
2.5.1 Infrastructure Maintenance Management	Automated management of fleets of maintenance, construction, or special service vehicles (i.e. snowplows, sand/salt trucks, etc.). User Sub-Service also includes the infrastructure-based systems that monitor vehicle location, vehicle status, and the output of sensors (such as environmental or road surface sensors) that are mounted on the vehicles. Also included are the systems within the maintenance vehicles that create this information and send it to the control centre or control system. The infrastructure systems perform vehicle dispatch, routing, and asset management.	• Approach Navigation Systems Inc. • CARIS • DPL Group • Geoplan Consultants Inc. • Intrignia Solutions Inc. • Jacques Whitford Environment • Kinek Technologies • Pinter Consulting Services Inc. • Seimac Limited • Spatial Decision Support Systems Ltd. • Trip Data & Safety Management Inc.	New user service under the U.S. Architecture.
3.11 Transit Vehicle Tracking (also known as Automated Vehicle Location, or AVL)	Track transit vehicle's real-time schedule adherence and updates the transit system's schedule accordingly. Vehicle position may be determined either by the vehicle (i.e. using GPS) or may be determined directly by infrastructure (i.e. beacons, sensors). The Transit Management Subsystem processes this information, updates the transit schedule and makes real-time schedule information available to the Information Service Provider Subsystem via a wireline link. The Transit Management Subsystem processes this information, updates the transit schedule and makes real-time schedule information available to the information Service Provider Subsystem via a wireline link.	• CARIS • DPL Group • Geoplan Consultants Inc.	Driven by American Disability Act which calls for transit investment to improve the accessibility and security of transit systems.
3.1.2 Transit Fixed-Route Operations	Performs automatic driver assignment and monitoring, as well as vehicle routing and scheduling for fixed-route services, replacing conventional manual logging. Transit vehicle data is integrated with that from other modes (e.g. rail, ferry, air) to provide the public with integrated and personalized dynamic schedules.	• ADI Group • Baseline Business Geographics Inc. • CARIS • Intrignia Solutions Inc. • Kinek Technologies • Pinter Consulting Services Inc. • Spatial Decision Support Systems Ltd. • Trip Data & Safety Management Inc.	Driven by American Disability Act which calls for transit investment to improve the accessibility and security of transit systems.
5.5.1 Freight In-Transit	This User Sub-Service covers the ability to track and monitor inter-modal containers and inter-	• Advatek Systems Inc. • AMIRIC Systems Inc.	Driven by increased demand for homeland

User Sub-Service	Description	Potential Providers	Other Comments
Monitoring	modal freight shipments anywhere in the transportation system and supports the monitoring of the container and its contents during the entire pickup-transport-drop-off period. This information is provided to freight customers, fleet managers, and logistics service providers.	• Compusult Ltd. • DPL Group • Geonet Technologies Inc. • International Communications and Navigation Ltd. • PCI Innovations Inc. • Seimac Limited	security.
5.6.1 Fleet Administration	Tracks the vehicle location, itineraries, and fuel usage at the Fleet and Freight Management Subsystem using a cell based or satellite data link and the pre-existing wireless infrastructure. Vehicles have processors to interface to sensors (e.g. fuel gauge) and to the cellular data link. The Fleet and Freight Management Subsystem can send dispatch instructions, and can process and respond to requests for assistance and general information from the vehicle. The User Sub-Service also provides connectivity to intermodal transportation providers using the existing wireline infrastructure.	• ALT Group Inc. • DPL Group • International Communications and Navigation Ltd. • Geoplan Consultants Inc. • Seimac Limited	
6.4.1 Emergency Response Management	Includes computer-aided dispatch systems, emergency vehicle equipment, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. The Emergency Management Subsystem would include hardware and software for tracking the emergency vehicles. Public safety, traffic management, maintenance management and many other allied agencies may each participate in the co-ordinated response managed by this sub-service.	• Geonet Technologies Inc. • Geoplan Consultants Inc. • xwave	Driven by increased demand for homeland security.